Integration of e-Learning Systems into Academic Programmes in South African Universities

A Doctoral Thesis

Presented by

Nhlanhla Wilton Mlitwa

For the Degree of Doctor of Philosophy (PhD) in Information Systems,

University of Cape Town

December 2010

Supervisor: Prof. JP Van Belle

The Doctoral Degrees Board
University of Cape Town (UCT)
Cape Town, South Africa

Thesis Title:

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THESIS ABSTRACT

E-Learning technology such as a course and learning management system (C/LMS) is widely described as educationally significant in academia, with students aggressively pushing for its integration into the curricula. In a university context, e-Learning is when networked computer systems and programs are adopted by institutions and used by lecturers to facilitate teaching, learning, course management and to support academic collaborations.

However, e-Learning conceptions and practices in the literature and background studies were found to be limited and contradictory. There was no agreement among the lecturers on the details of the perceived usefulness of a C/LMS, and on how to put it into effective use in South African universities. As such, usage was incoherent within and between institutions, despite massive investments in system acquisitions by institutions. This study set out to investigate the identified contradictions in conceptions, and to explain limited usage of a C/LMS among lecturers in South African universities. The goal was to empower curriculum planners, educators, policy makers, learners, system administrators and developers, with insight to improve e-Learning activities, and to make conceptual and theoretical contributions to the scientific body of knowledge. For this purpose, the interpretive research paradigm was adopted, together with qualitative data collection and analytical methods to investigate the factors affecting the integration of C/LMSs into academic programmes. Interviews were held with individual lecturers, and with groups of students at the Universities of Cape Town (UCT), Stellenbosch (US), the Western Cape (UWC), and the Cape Peninsula University of Technology (CPUT).

Activity Theory (AT) offers a holistic approach to analysing the individual and collective activity of a socio-technical phenomenon – within its full context. AT was used to explore lecturers' perceptions and preferences of e-Learning and C/LMS tools, the patterns of usage, and explanations thereof. Since the focus the study was on lecturers, student data was used only as background insight. As a theoretical contribution, AT was used to develop the Activity Analysis and Development (ActAD) interpretive framework to research the adoption of C/LMSs in universities. As contribution to the community of practice, literature and the ActAD framework was also used to unfold conceptual distortions on e-Learning, the meaning and role of a C/LMS, and related linkages with teaching, learning and pedagogy.

Findings confirm the unwavering support for a full integration of C/LMSs into university modules by learners. Technology infrastructure, system failures and a lack of interest by lectures frustrated CPUT and UWC students. Lectures were equally frustrated with system failures and poor helpdesk support, leading to minimal uses of C/LMS. On the other hand, effective system functionality, ease of use, and the efficiency of the user-support units were hailed by students and lecturers at UCT, and by lecturers at US. Similarly, the patterns of C/LMS usage were very high at UCT and US. C/LMSs were being used for limited purpose, mostly to offer content and to facilitate communication in the four universities.

The outcome of this empowers the planners, implementers and the entire community of practice in e-Learning, with a practical insight on hindrances and motivators of C/LMS usage. Ensuring sound management of infrastructure, efficiency of user-support units, and system usability, deserve careful attention. Finally, an e-Classroom environment should be designed and used to support not one, but different styles of learning across different pedagogical paradigms. To this effect, a discourse on e-Learning and pedagogy among educators should be re-invigorated.

DEDICATION

Special dedications go to my late grandmother, Mrs D.G. Zikalala, for her life-long sacrifices so that I could eat, survive and learn, and to my mother Catherine S. Zikalala who insisted from my childhood that I aim high in education. I hope your investments were worthwhile. Thank you!

ACKNOWLEDGEMENTS

I thank the following people for assisting me to complete this thesis and for their contributions in my academic development throughout the years:

- My high school teachers, Mrs Zuma at Sozabe High School (Madlala); Mr Zungu, at Buhlebethu High School (Umzumbe), and the teachers who taught me at Phindavele High School (Dududu): your contributions were not in vain.
- Mr John and Mrs Heather Harrison, as well as Mrs Rosemary Anderson (Ziphakamise), thank you for your contribution.
- Professor Andy and Ann Bytheway, your continued support is forever appreciated.
- Professor J.P. Van Belle, my academic supervisor, thank you for your guidance, understanding and support.
- Professors Johannes Cronje, Bennett Alexander, and Dr Retha de la Harpe, thank you for understanding and support.
- Professor J.D. Roode, you were always inspirational.
- Professor Johann Mouton, Centre for Research on Science and Technology. I have held on to your mentorship.
- My BTech and Masters students in 2009. Your encouragement meant a lot.
- Anti Zabanguni Gumede, I'm lost for words to thank you for those prayers!

To my spiritual friends, thank you for your prayers and encouragement, and finally I give all praise to the Lord for sustaining me thus far.

In closing, I would like to thank the Human Resources Staff Development Programme of the Cape Peninsula University of Technology (CPUT) for its financial support towards this programme.

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Acronyms

ActAD	Activity and Development (Framework)
ARPANET	Advanced Research Projects Agency Network
ANT	Actor Network Theory
AT	Activity Theory
AU	Actual Usage
BI	Behavioural Intentions
CAI	Computer Assisted Instruction
C/LMS	Course and Learning Management System
CoP	Community of Practice
CPUT	Cape Peninsula University of Technology
CSCL	Consumer Support Collaborative Learning
HE	Higher Education
HEI	Higher Education Institutions
HEM	Human Environment Model
ICT	Information and Communication Technology
IS	Information Systems
ITS	Intelligent Tutoring System
KEWL NextGen	Knowledge Environment for Web-based Learning, the Next Generation
MI	Multiple Intelligences
MKO	More Knowledgeable Other
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
ST	Structuration Theory
UCT	University of Cape Town
US	University of Stellenbosch
UWC	University of the Western Cape

CHAPTER ONE: INTRODUCTION

> University educators realise a need "*in this modern, complex world*" to turn out "*people who can play responsible major roles in our changing society, or else acknowledge"* failure in their "*duty as teachers and leaders…"* (Hamming 1969: 3-12)

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1. INTRODUCTION

The key objective of a higher education system, according to the Government of South Africa is to advance all forms of knowledge and scholarship – in line with "internationally observed standards of academic quality, with sensitivity to the diverse problems and demands of the local, national, Southern African and African contexts" (DoE, 1996, Sec 3.4). In line with this objective there has been a re-focus in universities' mission statements, towards higher quality in teaching, learning, scholarship and enquiry (UCT, Online). Emphasis is also placed on relevance to the needs of the industry, the local communities (CPUT, Online) and to the furtherance of lifelong learning (UWC, Online).

In 1997, for example, there were already signs of paradigm shifts towards service to society, knowledge production, accountability and emphasis on value for money in university offerings, where "*knowledge production and dissemination, research and teaching are no longer self contained activities but involve interaction with a greater variety of knowledge producers than in the past*" (Gibbons, 2001). Undertakings to advance economic and political transformation(s), to promote life-long learning projects and the advancement of technological innovations, have since been evident in almost all university mission statements (Mlitwa, et al., 2009).

As the opening quotation suggests, failure to produce quality in teaching and learning is not an option. To this effect, universities are revising their roles in society and are innovating new ways to improve the quality of their offerings. Information and communication technology (ICT) has emerged as a significant means through which these academic objectives are to be achieved. As such, technology has increasingly

become a central feature of university academic programmes.

1.1 Contextualising Technology in Higher Education

Whilst the use of a computer in education is as old as the very first personal computer itself (Luehrmann, 1994), educational technology can be traced back to Sydney Pressey's teaching apparatus in 1926 (Pagliaro, 1983). Termed a teaching machine, Pressey's apparatus introduced "*the mastery learning paradigm*" (ibid.), which enabled learners to undergo tests where they could proceed from one question to the next, only after giving a correct answer twice to the preceding question (Pressey, 1926). The format also provided the user with immediate knowledge of the results of tests (Pagliaro, 1983). The acceptance and adoption of this technology in the post-Great Depression and the Second World War period (1929 to 1955), however, was minimal and unsuccessful (Skinner, 1958).

Reasons for the non-adoption of the first educational technology remain tentative and debatable. The technology adoption perspective, however, suggests that the acceptance and adoption of technology is dependent on the positive perceptions of its usefulness, and the perceived ease of its use (Rodgers, 1983; Davies, 1989). From this perspective it can be argued that, if the usefulness of a technology is based on the value-adding capabilities it promises to the teaching and learning practice, the level of innovative development in the first apparatus was not advanced enough to earn the confidence of university communities. In other words, poor acceptance of the first educational technology can be linked to its lack of quality-enhancing capabilities.

Along this line of reasoning it is argued in this thesis that the reason for universities turning to ICT is to improve the quality of their offerings. This claim is supported by positive perceptions and the rapid adoption of ICT in education that followed interactive innovations after the founding of the Internet. The development of the first packet switching inter-network, the Advanced Research Projects Agency Network (ARPANET) in 1969 (Banks, 2008) opened new innovative possibilities in the years ahead.

1.1.1 Educational Technology and the Internet

It was not until the invention of the first intelligent tutoring system, the SAKI (keyboard tutoring) system by Pask and McKinnon-Wood's in 1956 (Patel et al., 2001), and the Illinois University's Programmed Logic for Automated Teaching Operations (PLATO) mainframe-based system in 1960 (Bitzer et al., 1962; Davis, 1980) that technology-assisted education as we know it, evolved. Though explanations to the sudden adoption remain hypothetical, the wider capabilities of PLATO seem to explain its prominence over earlier innovations. That PLATO could connect learners and educators, enabling learners to read content and exchange notes with educators online, illustrates this point. For the first time educators were able to monitor learner progress and to manage the whole learning process over the electronic learning interface (ibid.).

In effect, the establishment of the MERIT Computer Network project to interconnect instructional computing facilities among the University of Michigan, the Michigan State University, and the Wayne State University in 1971 (Harry et al., 1972), presents flexible interconnectedness as the most desired capability of an educational technology.

A further upgrading of this capability into the Havering Computer Managed Learning System (HCMLS) in London which, by 1980, had been used by 100 teachers and 10,000 students in various academic disciplines at the University of London (Broderick et al., 1980) clarifies this point. The ratio of 10,000 students to 100 teachers clearly illustrates the popularity of the HCMLS among students – and perhaps the similar interactive course and learning management systems (C/LMSs) that were yet to follow. As to why only 100 teachers could use the HCMLS, however, remains as unclear as the limited uses of current C/LMSs by teachers in modern universities.

1.1.2 Rationale for the Growth of ICT Adoption in Higher Education

As the capabilities of teaching and learning technologies continued to advance, the creation of the World Wide Web (WWW or the Web) in 1989 to 2000 (Berners-Lee, 2008) and the release of the graphical browser Mosaic (in September 1993) opened

new opportunities in networked educational computer solutions. As a system of interlinked, hypertext data (text, video, audio) and other multi-media accessed via the Internet for example, the WWW offered improved efficiencies in the handling, management and exchange of information in Web-enabled systems (De Leeuwe, 2007). Data, information and knowledge (including learning content) could now be developed and shared flexibly across time and geographical boundaries. At the same time the adoption of Web-enabled C/LMSs by academic institutions began to grow in unprecedented proportions. Every university for example, was either acquiring a commercially developed system such as WebCT (and Blackboard) with licensed annual fees or developing their own open-source based C/LMS in the period 1995, and beyond (ibid.). Examples of home-grown systems are almost infinite, and the list includes ILIAS 2.0, Moodle, KEWLnextGen, and the SAKAI (Sakai.org, 2010) collaborative project, among others. An overwhelming increase in the intake of Web-enabled ICT solutions among universities internationally (Middlehurst, 2003) with the growth rates of 136% to 522% at the University of Princeton, University of Texas and the Massachusetts Institute of Technology at the end of 2007 (Martin et al., 2008) supports this argument.

With regard to e-Learning technologies, such as a C/LMS, the rationales for its growth are wide-ranging and complex.

1.1.3 Explaining the Growth of e-Learning in Academia

E-Learning is the use of electronic methods and tools to support, facilitate and enhance learning as well as knowledge-sharing beyond time and place constraints (Czerniewicz et al., 2007). E-Learning tools include a networked computer (over the World Wide Web, Internet) or storage devices such as CD-ROMS or DVDs or multimedia (Knowledge Presenter, 2006). In this study the term is restricted to the use of interactive course and learning management systems (C/LMS) to facilitate: teaching; learning; storage and exchange of various formats of data; flexible interactions between educators, learners and the context; the effective management of the course, and to support other academic processes.

In clarifying the rationales for the growth of interactive technology adoption among the institutions of higher learning, this section describes the value-adding capabilities of

educational technology, and the reasons for its increased adoption in universities.

1.1.3.1 The relevance of e-Learning technologies

As a technical tool in educational, technology can extend *"human capabilities to solve problems"* (McLuhan, 1994), and "*assist students in the acquisition of knowledge"* (Sanbenito.tx, n.d) or to empower teachers and learners "*to develop new knowledge and skills individually or collaboratively*" (Liu and Hwang, 2010) more effectively. Technology, therefore, is a broad term that encompasses the technical means to, and enablers of, most innovations. As a domain either of knowledge, for knowledge advancement (UCT, 2003:1) or "*for underpinning innovations"* (DST, 2002:13)' for example, the meaning draws one closer to matters of handling information, knowledge and the ways in which these are created or formed, stored, exchanged and managed. Within the e-Learning framework, Laurillard and Masterman (2009) identify the new "*digital technologies*" *as* providing a comprehensive electronic equivalence (and an extension) of every educational invention that exists.

An extension of conventional books into electronic books (e-books), and the extension of physical libraries, fixed classrooms, chalkboards, notebooks, pens and notebook, into electronic versions of digital libraries, e-classrooms, interactive whiteboards, pod-casts and web-casts, according to Laurillard and Masterman (2009), means that technology can now be harnessed to serve every aspect of teaching and learning, in innovative and value-added ways. For these digital technologies to enable new ways of supporting learning (enabling learners to freely exchange ideas and their digital products) however, they should be embedded with interactive (Sharples et at., 2007) and collaborative capabilities (Laurillard, 2009). The strengthening of interactive capabilities in the new innovations, and the current growth of C/LMS adoption in academia, arguably describe the capabilities that educators and learners prefer on an ideal C/LMS.

The description of the capabilities of the new digital interactive technology suggests their relevance to teaching and learning. How this relevance informs increased adoption of C/LMS by universities, is discussed in the section that follows.

1.1.3.2 Why the growth of C/LMS adoption in higher education?

Value-adding capabilities of the new interactive digital technologies to educational processes strongly, but partially, explain the increasing adoption of these technologies in modern universities. Numerous other reasons are also offered by policy makers, practitioners and researchers.

The OECD (2005) cites attempts to widen access to education, to advance pedagogic innovation of the "on-campus" and "distance-learning" drives to enhance knowledge-sharing and, most significantly, to "*enhance and/or support learning in post-secondary education*" (OECD, 2005: 21) as the key reasons. Further, Middlehurst (2003) reports an increasing need for cooperation between universities, and between universities and the business sector as well as the need for survival in an increasingly competitive academic environment, as explanations to the increased adoption of technologies in education. In the same light, Liu and Hwang (2010) add the quest for institutional competitiveness, and efforts to improve the quality of education, as the fundamental reasons for increased adoption.

Given the wide-ranging and convincing nature of the reasons and rationales of the adoption of interactive digital education systems, it is clear why C/LMS adoption (in the form of system acquisitions) has escalated to unprecedented proportions within universities in recent history. As such it can also be expected that C/LMSs are fully utilised and exploited by educators and learners within the higher education institutions. To this effect, it is clearly argued in preceding sections that C/LMSs are widely adopted in the form of institutional acquisitions, by the institutions of higher learning. What remains unclear, however, is whether and how institutional acquisition of C/LMSs is supported by the actual usage in teaching and learning. As the basis of a research problem in this thesis, this point is discussed in detail under the research problem section.

1.2 Problem Formulation

This study builds on preliminary investigations into the conceptual understanding of teaching and learning technology, motivations for usage or non-usage as well as the patterns of usage by academic staff and students South African universities. As

elaborated in Chapter Two, studies by Mlitwa (2005), Czerniewicz and Brown (2006), America (2006), as well as Czerniewicz et al. (2007) reflect that whilst there is an overwhelming acceptance of the usefulness of educational technology in teaching and learning, there is no agreement on how it should be used. Similarly, there are inconsistent motivations and, ultimately, usage patterns by educators within and between tertiary institutions. The intention therefore is to make sense of a conflict between the high value academics place on the significance of ICT, and the limited usage patterns. In this process the usage patterns are confirmed by questioning students on their understanding, adequacy and usage patterns of e-Learning tools by educators, and their own preferred usage patterns. Educators are then engaged, and questioned on their beliefs in the value of e-Learning systems, in the quality of teaching and learning, and finally on the extent to which they are putting this technology into practical use in their daily teaching practices.

Drawing on academic literature, an argument is formulated that e-Learning adds flexibility and convenience which in turn improves efficiencies in learning (Ncubukezi, 2009). As such, learners want more of it. Further, educators may also understand e-Learning technologies to be adding a positive and transformative value into teaching and learning practices. This positive transformative value, however, may not be seen as a panacea for a realisation of all teaching objectives for every individual educator (Laurillard, 2009; Czerniewicz et al., 2007; America, 2006).

1.2.1 The Research Problem

ICT is considered to be very important as a tool, a medium, a platform, an environment, an enabler, and an enhancer of teaching and learning processes. Whilst e-Learning is not a panacea for all educational ills, most educators see it as relevant to teaching and to the learning needs of students. The paradox, however, is that educators seldom agree on the concepts surrounding the use of educational technology, and on how C/LMSs should be used to improve teaching and learning practices (Czerniewicz et al., 2007). Therefore, positive beliefs alone may not translate into action. Where e-Learning systems are used, patterns are inconsistent between universities and within departments in each university. A mismatch between how educators are putting these systems into use and the expectations of learners in South

African universities has also been observed.

The problem therefore is that whilst the potential of technology is accepted, it is not known how it be exploited to gain maximum benefits in education. Hence the realities of implementing it in a diverse higher education terrain remain complex, fragmented and incoherent. As a result, whether or not current uses of educational technology are adding value (and the type of value added, if any) remain uncertain. With this uncertainty, financial investments made in developing and acquiring educational technology solutions within universities remain hard to justify.

Whilst educators acknowledge the usefulness e-Learning technology, there is very limited clarity on specific “how” details. There is no agreement on the specific value it offers to teaching and learning, and how it improves learning experiences of students. Where such belief is expressed among educators, only the belief exists that it does, but the “how” details of achieving and even improving such gains remain unclear. With the status quo, university administrators, education and curriculum planners, policy makers and government stakeholders, as well as researchers interested in the field of education, technology, pedagogy and learning, remain in the dark. As a result, improvements remain ill-informed and therefore likely to follow a misguided route, with benefits only realised by chance rather than by design.

According to the literature in Chapter Two, when access is no longer a limiting factor, C/LMS usage becomes dependent on interactions between the social and technical factors of technology adoption. These are individual intentions, motivations, interactions, procedures, enablers (technical, social and institutional), activities and achievements (Du Plooy and Roode, 1999). These factors are used to formulate a research question framework, Figure 1, in Section 1.2.2.

1.2.2 The Research Question Framework

Since educators believe in the potential of ICT, clarity on the factors that motivate or limit their use of C/LMSs for educational purposes is sought in this study. Hence the study draws on literature foundations in Chapter Two, as well as the operational (the work activity) and analytical framework in Chapter Three. This work is used to operationalise the research problem by breaking the main research question into bite-

size chunks of sub-questions in Table 7: Research Instrument, under the methodology section in Chapter Four. To paint the map of this enquiry, the summary of the research question framework is presented in Figure 1.

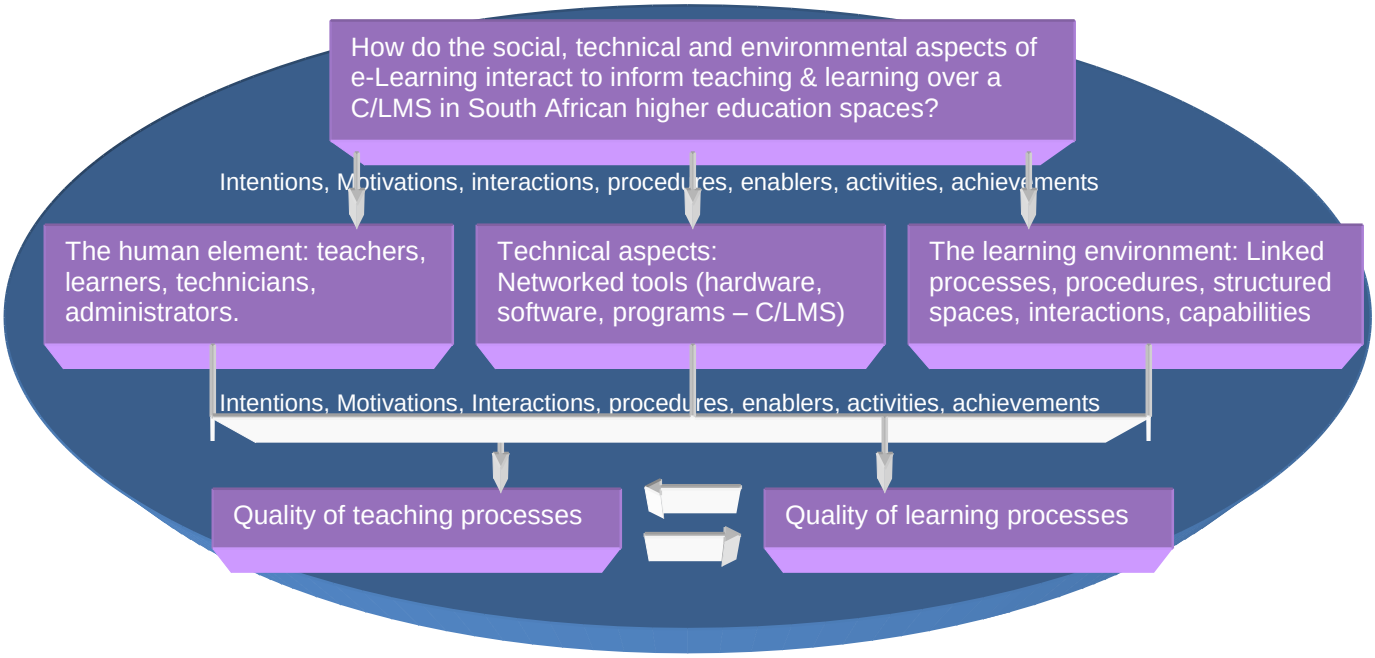

Figure 1: Research Question Framework

Figure 1 locates the context of the research question into the socio-technical, individual and the technology factors of influence in this investigation.

1.2.2.1 Research Question

On the basis of a research problem, the question is raised in this thesis: how do the social, technical and environmental aspects of e-Learning interact to inform teaching and learning over a C/LMS in South African higher education spaces?

As shown in the first box in Figure 1, the question focuses on the interplay between the social, technical and environmental factors to the choices in teaching and learning practices. The sub-questions presented in Table 7 (Chapter Four) represent diverse factors that are embedded in this main question, viz., the socio-technical aspects of C/LMS usage at universities.

The social element includes educators, learners and administrators with separate, but

interacting roles in the teaching and learning process. Within the e-Learning context, a C/LMS as a teaching and learning platform and interface (Kolas and Staupe, 2007) represents the technical (hardware, software programs) aspect of e-Learning. The actual teaching and learning processes over a C/LMS platform are further facilitated by the interplay between processes, intentions, motivations, procedures, structured spaces, interactions and capabilities, as well as the environment (Mlitwa and Van Belle, 2010). Motivations in this case refer to the factors that encourage the use of C/LMS in teaching functions, or in their learning engagements. The trick here is that when the intentions for teachers clash with those of learners, either due to negative perceptions based on limited capabilities or on what Davies (1989) refers to as perceptions on the ease of use (PEOU), a discrepancy in usage may arise.

Intentions for teachers may be based on a positive perception of the value that can be added by the use of a C/LMS to teaching (for educators) or to learning (for learners) processes. Furthermore, clarity of procedures, programmes, activities and their relevance to educational processes are considered the significant motivators of technology usage. In effect, the Human Environment Model (HEM) of Du Plooy and Roode (1999) puts forward six factors that influence the adoption and use of an information technology (IT): (i) the individual factors, (ii) innovation factors, (iii) task related factors, (iv.) organisational factors, (v) environmental factors, and the (vi.) group factors. The six factors overlap with the attitudes towards a technology, perceptions on the ease of use, perceived usefulness and behavioural intention of users as presented by Rodgers (1983) and Davies (1989). These factors are grouped into the three key aspects of the question framework: the social, the technical and the environmental factors. They are further elaborated and embedded in the research instrument under the methodology section in Chapter Four.

1.2.3 Motivation and Rationale

Whilst academics and students seem to agree that e-Learning technology is important in enhancing teaching and learning (Czerniewicz et al., 2007; Mlitwa and Van Belle, 2010), the irony is that most educators are not using C/LMS in their teaching practices. Even for those who do use it, there is no clear understanding on how it should be used, and ultimately there are contrasting motivations and patterns of usage. Conclusions in

a study by Czerniewicz et al. (2007: 66) attribute this level of uncertainty to "*intersections and overlaps in meanings as discourses interact and co-exist in contradictory practices claiming to support efficiency and improvement on the one hand, and equity and redress on the other.*" The authors recommend that technology be contextualised as something more than just an automatic advantage to teaching and learning, or as a panacea to heal the historical lack of access to higher education.

The contextual factors determining the potential of ICT in transforming teaching and learning should also be investigated. Because of lack of clarity on this important subject, America (2006: 99) suggests an investigation into the "*perceptions of learners from diverse backgrounds with regard to the integration of the Internet in teaching and learning*…" at university level. For e-Learning to be properly understood in developing countries, therefore, Andersson (2007) further recommends an extended understanding of the individual student characteristics.

Preliminary findings in the second chapter suggest that learners are attaching very high expectations to the use of C/LMSs, only to be disappointment by being limited to non-usage of these systems by educators. The possibility is that learners may be dissatisfied with minimal usage of the tool. Further, hefty institutional investments into the acquisition of C/LMSs is hardly justified by non-usage and, with inadequate insight, institutions may not have the appropriate means to react to the problem. The challenge, therefore, is to understand the dynamics and motivations of usage and non-usage so that clarity on productive usage patterns can be established. On the basis of the background studies, it is anticipated that ICT will not be coherently used by all educators and, where it is used, that it may often not be integrated with pedagogy. Pilot findings in Chapter Two suggest that the usage of C/LMSs is not likely to be campus-wide, nor coherent within departments in all institutions.

1.2.4 Research Objective

In the light of a research problem, the study seeks clarity among learners and educators in South African universities on their perceptions about the usefulness of e-Learning systems. In this respect an understanding on how the significance is experienced and reflected in current practices is sought. Confirmation is also required

from educators on whether e-Learning (using C/LMS) does in fact add value to educational processes, and how academics are using these tools. In cases of limited usage, explanations together with suggested solutions are sought. In this process, learners are asked to reflect if e-Learning tools are utilised satisfactorily by educators so as to understand issues that may be affecting usage, and to inform corrective measures.

The intention is to improve the beneficial application of learning technologies in teaching and learning at tertiary institutions and to improve the conceptual clarity of terms surrounding e-Learning practices within the higher education context.

The main objective of this research effort is to contribute to the advancement of teaching and learning practices by curriculum planners, educators, policy makers, learners, system administrators and developers as well as university administrators and respective government stakeholders. Further, making a contribution to the scientific body of knowledge remains the underlying goal, and a motivation for this study.

1.2.5 Contribution to the Body of Knowledge

The study interrogates the gap between institutional adoption and integration with pedagogy. It further expands the conceptual understanding of technology adoption in information within the IS discipline, and the underlying aspects of the practice of e-Learning in academia. The contribution to the body of knowledge is, at least, threefold. In the first instance, the theoretical literature and empirical studies in the field of technology and education is used to enhance the clarity of e-Learning concepts. In particular, existing conceptual frameworks are explored and found to be inadequate. Further theoretical literature is then used to clarify the purposes, the characteristics and the components of an ideal C/LMS in Chapter Two. In the second instance, the Activity Theory is used to develop a new operational theoretical framework for this study – the Work Activity Framework in Chapter Four. The contribution in this instance is that researchers will be able to apply a new framework in operationalising and in analysing e-Learning phenomena in future studies. The third contribution relates to the new insight that emerges from the findings of the thesis. The findings link theoretical and conceptual knowledge to the practical reality in academia, thereby offering

opportunities for practical relevance in the field of ICT and education in a modern university.

These theoretical perspectives are challenged by a contradiction between the findings that reflect positive perceptions on the usefulness and ease of use of a technology by educators, with negative patterns of usage. The findings, therefore, contribute to the scientific body of knowledge as they confirm, dispute, explain and expand the held understanding of the factors of adoption and use of technology innovations.

Clarity on the practical socio-technical factors that inform usage and non-usage of e-Learning solutions offers insight, required by curriculum planners, educators and systems administrators, on preferred features and uses of learning management systems. In this way system designs, application processes and usage patterns can be shaped according to the relevant need, and ultimately contribute to the value of usage and ultimately contribute to improved implementation.

1.2.6 Structure of the Thesis

This thesis is structured into seven chapters. Chapter One introduces the study. It outlines the historical evolution of educational technologies and its acceptance as an educational tool in academia. The research problem, the motivation and rationale of the study, as well as the structure of the thesis, are presented in the first chapter.

The second chapter entitled, “Literature Foundations”, presents the basis of the investigation as informed by preliminary studies. The status of research in the field of e-Learning, is discussed in Chapter Two. These issues include the contextual tensions and interactions between teaching, learning and related technologies in tertiary institutional settings. In this respect a discussion is raised on various theoretical perspectives of education and technology.

The method of enquiry and a methodological framework, outlining how research is conducted and how data is analysed, is presented in Chapter Three. The findings are presented in Chapter Four. For example, insight into what the students expect concerning the usage of C/LMS in their courses, their levels of satisfaction with current patterns of usage, and their views on what should be improved, are presented. The analysis and interpretation of these data are presented in Chapter Five. The thesis

ends with recommendations, evaluation and conclusion in Chapter Six. In this closing chapter, the extent to which the study makes a practical contribution to the practice, and a scientific contribution to the body of knowledge, is evaluated. The structure of the thesis is summarised in Figure 2

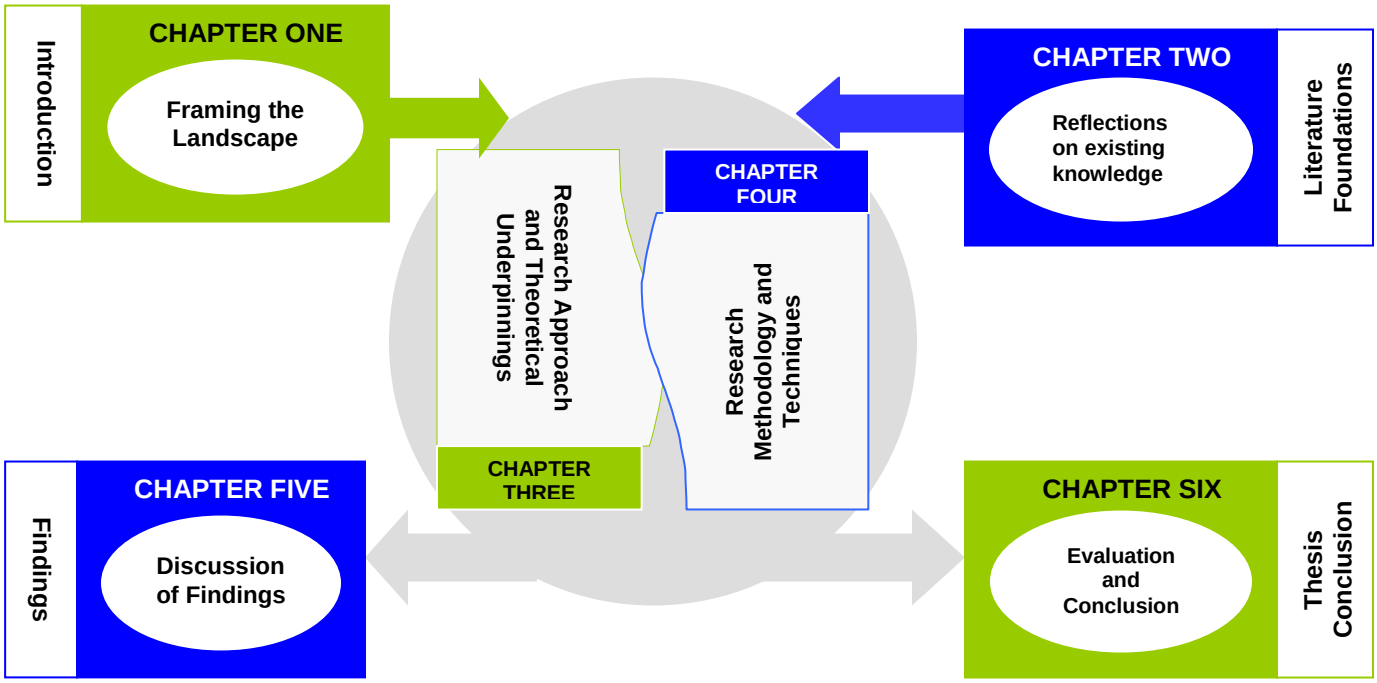

Figure 2: Structure of the Thesis

In summary, the thesis consists of seven chapters, the reference list and appendices.

1.3 Terminology of the Study

Whilst most terms are clarified as they are introduced in the body of this thesis, this section defines dominant vocabulary of this work. The major terms are Teaching and Learning, the Learning Environment, Technology Adoption, ICT Integration, Technology Usage, e-Learning and Blended Learning.

1.3.1 Teaching and Learning

The notion of teaching is so intertwined with the phenomenon of meaning-making, knowledge creation, development and knowledge exchange, that it cannot be understood independently of learning. Similar to learning, teaching may be viewed from the knowledge transmission and knowledge construction perspectives (Schoenfeld, 1998). As used in this study, teaching refers to any deliberate activity and process by

an educator or group of educators through a formal or informal (Dewey, 1938) contact or distance system, with or without tools, to foster and promote learning for students (Breier, 2006). Also understood as knowledge instruction using various methods and theories (pedagogy) as shaped by teacher preferences and the surrounding environment (Kincheloe, 2008), a deeper meaning of teaching is derived from the type of learning it enables.

The method of teaching determines the form of knowledge being learnt, and the quality of the actual learning. The “inert” and “authentic” forms of knowledge are identified and attributed to different teaching methods (Kintsch and Van Dijk, 1978; Vanderstraeten and Biesta, Online). The “inert knowledge”, refers to the form of knowledge that even if it applies to a variety of domains, is presented in restricted contexts. It is linked to the direct mode of instruction. Often a learner directly receives knowledge from the teacher with a requirement to memorise and be able to recall it later on. Attributed mostly to the dis-embedded nature of learning environments, this form of knowledge acquisition does not seem to prepare a learner to be able to spontaneously use the knowledge later. "Authentic learning", on the other hand, refers to a holistic approach to learning that enables direct participation in the development of knowledge by the learner (Donovan et al., 1999). The learning environments as factors of meaning and sources of learning are accounted for under this model.

1.3.2 Learning Environment

Learning environment refers to the setting, space and contexts for learning and learning processes. A combination of a setting, space and context means that it has physical as well as contextual presence (Banda, 2005) based on some purposeful process – which is learning. Further, a purposeful process carries with it a notion of goal and objective pursuit. As learning in this case is an objective, then the question emerges as to the kind of learning that should be embedded within the pursued objective. It has been argued in the background section of this thesis that institutions of higher education are seeking ways to improve the quality of education by innovating methods, procedures and tools to enhance teaching and learning processes, including learning environments.

An ideal learning environment, therefore, should enable the efficient realisation of

these goals. To contextualize an ideal environment, Maslow's hierarchy of needs can be used to support the meeting of the psychological needs of a learner in a learning environment (Banda, 2005). Just as people need to be motivated to carry out tasks (Maslow, 1943), learners also need to be motivated to actively participate in a learning process. People also want to be convinced of the significance of what they do, which means that learners will want to feel important (self esteem needs) and need to have a sense of achievement (self actualization needs).

The learning environment, therefore, should stimulate, challenge and provide opportunities to use diverse talents (Banda, 2005). Further, the learner should feel individually valued. That is, the environment should promote ownership and belonging, enable social interaction, make learners feel known, cared about and secure. With the enhanced interactive capabilities of Web 2.0, learners in a Web-enabled environment should be able to interact creatively with each other and with the content, in a stimulating and fulfilling way (O'Reilly, 2005). From the cognitive-psychology standpoint, independent participation in the construction of knowledge would enhance a sense of achievement and self worth (Piaget, 1977; Vygotsky, 1978; Bruner, 1986). In closing, a learning environment should consist of the following aspects: a conducive physical setting, space, stakeholders, relationships and interactions; structures and expectations; goals and objectives; processes, procedures and tasks; language and communication; and tools such as a learning management system (C/LMS) in an e-Learning context (Banda, 2005).

1.3.3 Technology Adoption

The terminology "technology adoption" is defined and interpreted differently by the various technology stakeholders. For Rodgers (1983) it refers to decisions to make full use of an innovation as the best course of action available. A direct opposite of this is "rejection". This definition clearly refers to adoption as a "decision to", rather than the actual usage. The meaning is complicated by additional interpretations that either see adoption as "user acceptance", "use" (Davies, 1989), "uptake", "acquisition and assimilation", "implementation" and "routinization" (America, 2006: 12). Generally, the "adoption" phenomenon encompasses policies, strategies, processes and tasks

employed by an organization to identify, acquire, and diffuse appropriate information technology (Huff and Munro, 1985).

In the practical sense, adoption is when educators “take a particular technology that is currently making a tremendous impact on the world of work as well as social and private lives, and make it ‘theirs’; i.e. essentially to take tools that were not originally developed for learning and teaching and transform them into vehicles for greater opportunities for learning” (Lund, 2003). Like most accounts of adoption, however, this definition does not distinguish between adoption as the decision to use, and as the acquisition of a tool on the one hand, and the actual usage. Failure to distinguish between the two processes ignores empirical findings in South African higher education studies by Mlitwa (2005), America (2006) and Czerniewicz et al. (2007) that consistently reveal operational differences in the two terms. The studies show higher patterns of ICT adoption (in terms of acquisition and appropriation) with no evidence of its usage for teaching and learning by academics and students. In line with these findings, the notions of ICT adoption and usage are separated in this study. In this thesis, adoption is used to refer to decisions to acquire and use (acceptance) as well as the acquisition and adaptation of a technology.

1.3.4 ICT Integration

ICT integration is understood as a phenomenon of technology adoption, adaptation, appropriation or incorporation into educational programmes, where it is literally used by teachers and students to enhance teaching and learning. Unlike adoption, which includes the acquisition of a technology with intentions (which may or may not be realised) to use it (Dedrick and West, 2003), it is a phenomenon whereby “… classroom teachers actually incorporate technology in their teaching” (Zhao et al., 2002). It is also a dynamic and complex phenomenon that consists of humans (teachers and learners) interacting with, and through, technologies in order to raise their competence within a knowledge domain (Lund, 2003).

1.3.5 Technology Usage

Technology usage in this study is understood separately from adoption, but as something that can be part of adoption (Mlitwa, 2005). Whilst it may include both the

acceptance and actual usage of the tool, the pilot research also suggests that technology is used, in some cases, not willingly, but under duress because of an institutional policy (Czerniewicz et al., 2007). Either with or without acceptance, the user follows specific procedures and routines in applying the tool to achieve specific goals and objectives.

1.3.6 E-Learning

Also referred to as technology assisted learning (Lorillard, 2008), electronic learning (e-Learning) refers to the use of electronic methods to support, facilitate and enhance learning, and to share knowledge beyond time and space (Czerniewicz et al., 2007). In this thesis the term is specifically restricted to the use of interactive, Web-enabled course and learning management systems (C/LMS) to facilitate teaching and learning, as well as other educational processes (Masterman et al., 2009). Other educational processes include flexible communication, interaction, material storage and the general management of the course (Mlitwa, 2005).

1.3.7 Blended Learning

In this research blended learning is understood as a cost-effective form of learning derived from a mixture of educational techniques and tools that can be selected and configured to suit the communication and learning styles of learners, according to the desired outcomes and objectives of the activities (Laurillard, 1993; Amstrong, 2003). Such a combination of tools and learning styles ranges from integrated learning technologies such as videoconferencing, e-Learning (including C/LMSs), videos, CD-ROM and print resources to a variety of instructional strategies such as action learning, participatory learning, interactivity, case studies, traditional face-to-face classroom activities and more (Amstrong, 2003; GDLN Toolkit, 2005).

1.4 Conclusion of Chapter One

In introducing the study, this chapter opened with a contextual argument that the central objective of the higher education system is that of advancing the quality of teaching, learning, scholarship and enquiry. In addition to traditional academic objectives, modern universities also emphasise relevance to the needs of the industry,

to be of service to the community and to advance the ideals of life-long-learning. In the light of improved capabilities that are embedded in the new ICT innovations, university institutions are turning to the networked and interactive C/LMSs to support and improve education. As technology solutions become more complex, more convenient solutions emerge, and the more advanced that technological developments become, the more a technology is adopted by higher education institutions.

The problem is that despite the overwhelming adoption of C/LMSs by the institutions of higher learning in South Africa, integration of these systems into pedagogical practices remains uncertain. Further, the educational value of these systems in the eyes of the educators is mixed and unclear, and its usage, therefore, remains minimal. The paradox is that despite the overwhelming demand for the full integration of C/LMSs into the curriculum and pedagogy by learners, reluctance on the part of educators remains a limiting concern. Without a better insight into the problem, education and curriculum planners, policy makers and researchers interested in the field of education, technology, pedagogy and learning, remain in the dark. As a result, remedial efforts are likely to follow a misguided route, with benefits only realised by chance rather than by design. In the light of massive investments made in acquiring and operating existing C/LMSs in modern universities, ignoring the status quo has further negative financial implications as non-usage cannot justify the costs.

The purpose and motivation of the study is to understand the patterns of C/LMS usage, understand motivations for these patterns, understand the factors and motivations for its usage and non-usage in academic programmes, and, hopefully, to inform solutions. The next chapter (Chapter 2) draws on the literature and preliminary studies to clarify the context of the thesis, and to form a basis for the theoretical framework later in Chapter 3.

CHAPTER TWO: LITERATURE FOUNDATIONS

"Education has problems. Technology has solutions looking for problems. The two should fit, and this conviction fuels the continuing interest in technology-enhanced learning" (Laurillard, 2008: 1)

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2. INTRODUCTION

It is argued in the first chapter that whilst computer technology for education is as old as the first PC itself, its adoption in academia is a more recent, growing and purpose-driven phenomenon. As the research problem states, however, adopted C/LMSs are both misunderstood and under-utilised in academia. They are considered important, yet their application into pedagogical and learning practices remains uncertain and incoherent within universities.

This chapter opens with a discussion of the divergent meanings that educators attach to the conceptions of e-Learning and the C/LMS. In support of the problem statement, pilot studies to the effect that adopted C/LMSs are under-utilised in academia are also discussed in detail in this chapter. To explain this confusion, Laurillard (2008) links the problem to an incorrect focus by educators, where they focus on technology, instead of first understanding exactly "what it means to learn", in their interactions with e-Learning technologies. As the opening quotation indicates, "*education has problems*" that must be identified first before technology solutions are sought, not the other way round. Further, that "*technology has solutions looking for problems*", hence, "*the two should fit*", with technology fitting into the problems of education. The current patterns of C/LMS usage in academia are discussed in section 2.2.

The critique of the current usage patterns is then followed by a discussion (or rather, the articulation) of the meaning of learning. This is used as a basis for the suggestions on what the appropriate uses of e-Learning tools (C/LMSs) should be. In this respect, the paradigms, theories and styles of learning are interrogated in section 2.3. This is followed by the assumptions of what the characteristics of an educationally significant C/LMS should be. The components of this type of C/LMS are also suggested and presented in Figure 4 of section 2.4. It is then argued in section 2.5 that a C/LMS has a potential to enhance not one, but all learning styles. A multi-modal e-Learning

framework is then presented and discussed in Figure 5: Mode of Instruction, Learning, and Related Instructional Toolsto illustrate this point. The closing summary concludes the chapter. A graphical outline of this chapter is presented in Figure 3.

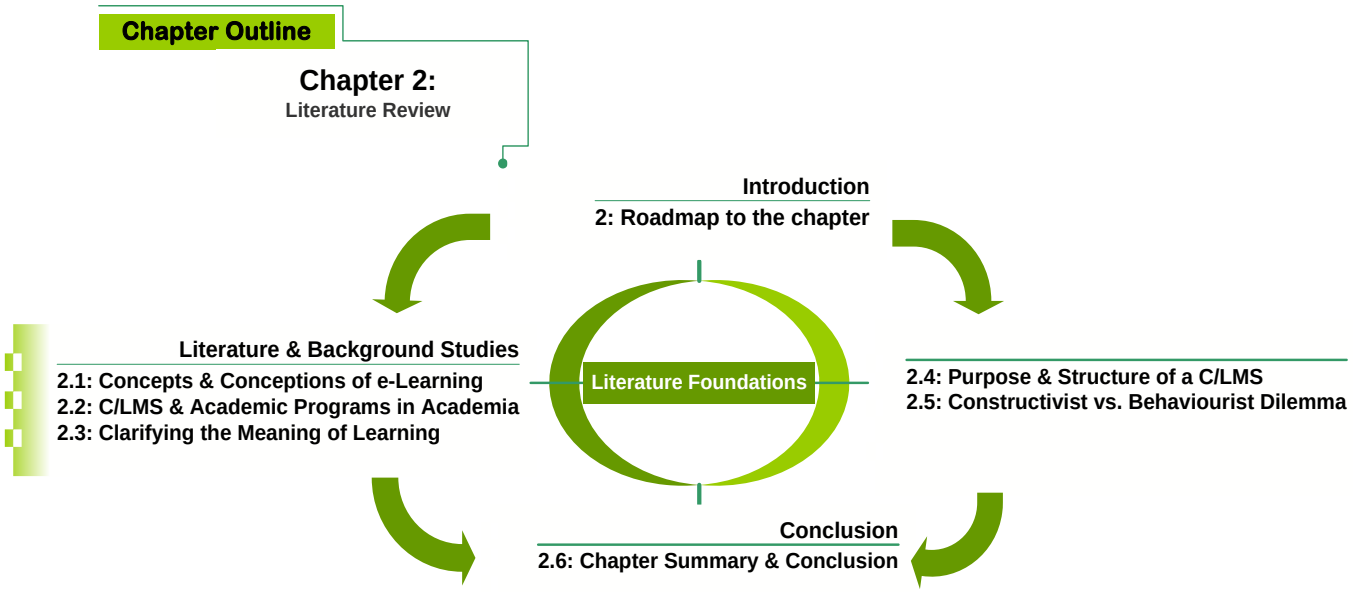

Figure 3: Outline of Chapter 2

2.1 Divergent Interpretations of e-Learning Concepts and Tools

Studies in South Africa reflect divergent perspectives by lecturers on the role and impact of ICT in teaching and learning (Czerniewicz et al., 2007). A dominant voice within this debate, however, is that educational technology should be learner-centred (Mlitwa, 2005; Laurillard, 2008; Liu & Hwang, 2010).

2.1.1 Consensus in Value and Purpose, Disagreements in Methods

Arguments are that when applied correctly, technology will improve the effectiveness of learning experiences (Tinio, 2002) or educational processes (Muianga, 2004) and ultimately, the learning outcomes (Eom, et al, 2006). Its decentralised nature frees the learner from the educational provider (Khan, 2000). E-Learning technologies should enable students to actively engage in the construction (rather than the passive receipt) of knowledge (Muianga, 2004). The implication, albeit a controversial one in this

respect, is that using e-Learning systems to further non-constructivist forms of instruction is not educationally significant. For example, one lecturer stated during the pilot phase of this study, that she "*hate[d] the word e-learning"* because it makes *"people think about the model that M-Web puts forward, that all the content is online and you go and get the content… I reject that model… I don't like the label e-Learning, because it is associated with the instructivist approach to learning*" (I.K., 2006). For some reason instructivist learning and ultimately the use of a C/LMS to support it is rejected. Instead, a C/LMS is linked almost exclusively with constructivist learning. The merit of this claim is critiqued as reductionist in this thesis, with learning theories used to support C/LMS usage across pedagogical paradigms later in this chapter.

2.1.1.1 E-Learning as a Web-enabled Interactive Environment

Arguments that e-Learning tools (i.e. a C/LMS) could help even to eliminate some debilitating factors such as time, space and pace in education (Sekgwelea, 2004) suggests an interactive format. In fact, most lecturers assume that e-Learning has to do with the Web and not with stand-alone solutions. One lecturer, for example, says that "… *if people talk about e-Learning they are talking about using the Web and e-mail, which is not quite using PowerPoint presentations or using a tutorial on a stand-alone computer*" (IH, 2006). Another leading scholar in computer-mediated education at the University of Illinois, Haythornthwaite (2008), sees e-Learning simply as "technology-based learning" where lectures, homework, quizzes and exams are delivered almost entirely online. The teacher in this instance should only be "*a guide, a support for the student in their learning process*" (Ritrovato, 2008).

Authors such as Fox and Mills (1997) even expected Web-technologies to totally change all forms of education. Arguments are that C/LMSs will continue to "… *inevitably transform all forms of teaching and learning in the twenty-first century*" (Brown, 2002), which assumes a "one-size fits all" type of a solution. In this respect, McKeogh and Fox (2009) cite this hyped sense of optimism as the main driver of the increasing adoption of C/LMSs by traditional universities in the United Kingdom (UK) in 2007 to 2009. As students can now learn without physically setting foot on campus, universities, according to McKeogh and Fox, can admit more students at lower operation costs. In the same context, the Blackboard (WebCT) system is used to

support interactions between the ever-multiplying campuses in La Trobe University in Australia (Johnson, 2009).

Whilst e-Learning technology plays a significant role in teaching and learning processes, scientific research disputes the transformation aspect. Drawing on the observations of the World Economic Forum Global Advisory Council on Technology and Education in 2008, e-Learning technology in higher education institutions across Europe, Canada, Asia, Africa and Latin America, has played "an integral role", but it "has not yet transformed education" (WEF, 2008). To the contrary, Smith, Jaggars and Bailey (2010) found that online learning alone (if not blended with other methods, in more relevant conditions) may even "*reduce academic success*" and learning "*progression among low-income and academically under-prepared students*" (p11).

2.1.1.2 Computer Technology as "Just the Manipulative Tools"

There is a group of lecturers who are in complete disagreement that a computer can solve educational problems. As a lecturer in one South African university emphasises, "*a computer is a machine, it has no life to it. It has no personality to it. It is a creation of man, ok! ... it is neutral… it is what you do with it that is important, it is not learning itself and that is where some of the people get confused. I think they see technology as being able to teach people and I don't believe it can*" (IK, 2006). The neutrality claim is also contested, with dissidents arguing that "*there is no such a thing as a neutral tool*", because it empowers one to do something that they "*would not otherwise have been able to do*…" (IX, 2006). Another lecturer voiced a complete sense of pessimism, saying, "*No, it is a tool and tools are used to manipulate. So, how can it be neutral… it is being used as a divisive tool and will continue to be used as a divisive tool, just as genetic engineering is going to be used as a divisive tool*" (I.M., 2006). E-Learning tools in this instance are portrayed in the negative (manipulative and divisive) rather than the educational sense.

2.1.2 Conclusion on the Perspectives of e-Learning

Divergence of perspectives in this debate clearly shows the tension in the operational interpretation of e-Learning tools such as a C/LMS. Nevertheless, optimism in the potential of this technology to enhance learning surpasses pessimism. In effect, the

emergence of the term “Technology Enhanced Learning (TeL)” (Laurillard & Masterman, 2009) among the educational experts in the United Kingdom (UK) offers a cautious but generic outlook into e-Learning. Cautious in the sense that it acknowledges the widely accepted notion of enhancement where a technology is not seen as a source and destination; rather it is seen as one of the value-adding aspects to a much broader and multifaceted-phenomenon of learning.

In line with this phrase, Laurillard and Masterman (2009) offers a more generic interpretation of e-Learning tools. The authors use the term “digital technologies”. The logic is that these technologies “*now provide the electronic equivalent of every educational technology invented so far: paper, books, libraries, chalkboards, notebooks, pens, broadcasting:* [which are] *all mirrored in different kinds of digital technologies, often bearing the same names, such as e-book, digital library, interactive whiteboard, notebook, light-pen, pod-casting, web-casting*”, etc. (ibid.: p2). Because of these capabilities, these digital technologies can be harnessed to serve every aspect of education, including teaching, learning and the management of the course. Clearly, the temptation to prescribe procedures and the mapping-out of usage boundaries is successfully, and usefully so, avoided by the authors.

In line with the problem statement, it is clear that educators have different interpretations to the conceptions of e-Learning in academia. It is this conceptual incoherence that raises curiosity on the patterns and purposes to which e-Learning systems are applied into academic programs in academia.

2.2 C/LMS Integration into Academic Programmes in Academia

The idea (rationale) of this thesis emerged from the observations of a spontaneous adoption of the Web-enabled C/LMSs by academic institutions globally, and in South Africa at the dawn of the millennium. As argued in the preceding section, this trend is fraught with disagreement among educators on the conceptual and operational interpretations of the adopted e-Learning tools. As such, the actual implementation of the adopted systems within academic programmes is also unclear. In other words, it is unclear whether educators are using C/LMSs within their courses, and how. To this effect, the background to the motivations for the spontaneous adoption of C/LMS

among global universities, as well as the insight on usage patterns is discussed in this section. Whilst international examples are used to clarify the background, emphasis is placed on South African examples – which are a basis of investigation in this thesis.

2.2.1 Understanding Rapid Adoption of Web-enabled C/LMSs

This section uses the findings of the three international surveys to demonstrate the rapid adoption of C/LMSs in academia, and to clarify the rationales for the adoption. These are the Surrey University survey on 500 universities in Europe and across the British Commonwealth countries in 2003, the MIT survey on ten universities in the USA in 2006, and the survey on South African universities in 2007.

Drawing on the work of Middlehurst (2003), the rationales for C/LMS adoption in Europe and the Common Wealth nations as well as in South Africa (Czerniewicz, et al, 2007) are graphically presented in Table 1.

Table 1: Rationales for the Rapid Adoption of e-Learning

Circumstance and Driver	Implications for Higher Education	Reactive Changes	Examples	Motivations/Rationales (Similarities & Differences)
Expanding enrolments Driver: *Social (demographic changes; Changes in attitudes and values); Political; and Economic*	Demand for HE is on the rise. Institutions feel pressure to prepare for increased distribution of instruction	• Emergence of virtual universities & Consortia as an extension of HE provision • Emergence of new HE providers who now compete with traditional HE institutions (p4)	• Poland Govt. set 180+ private HE institutions with online presence in 1989-2003 • Malaysia set up 400+ private institutions with online presence in 1992-1999 • Greek Govt. established the Hellenic Open University in 2000 to extend access to previously disadvantaged groups • Almost all traditional universities in SA are acquiring one form of a C/LMS or another *	• Facilitating the sharing of resources between universities, & Streamlining distance education management (Malaysia) • Equity (Greece) • Emphasis on using ICT for increased student flexibility (Australia) (p8) • Enhance on-Campus teaching & learning (the entire Commonwealth) (p8) • To widen access beyond the campus (p8)
Growth of new competitors, virtual education and consortia Driver: *Social; Economic; Global Environment; and Technological Developments*	Pressure to diversify activities, quantity and quality wise, to match or bypass the competition.	Collaboration of efforts • HE institutions seeking to enhance their activities; • Collaborating among themselves, with the private sector, and with government, to share costs and expertise (p7)	Regionally: • Governments of Australia, Japan, and New Zealand jointly funding a satellite network to serve 12 campuses of the University of the Pacific in these member countries (p5). Within Nations: • French Govt sponsors 'digital campuses' to boost provision of online courses; • Pakistan Ministry of Science led plans to develop a virtual university in 2004 • Finland – Nat. Virtual Univ. & Nat. Polytechnic	• Enhance economic competitiveness by responding to the needs of lifelong learning • To address the national shortage of manpower (Pakistan) • Protect internal university system from outside competitors (Finland) • Promote access to a wider population (Finland) • Enhancement of distance education (Commonwealth) (p8)
The global activity of many institutions Driver: *Social; Economic; Global Environment; and Technological Developments*	Competition for students is global, & institutions now operate beyond their borders. Hence a need to effectively distribute instruction internationally	• Emergence of a full-force "Borderless Education" by many universities	• Open University (UK) serves 260 students Worldwide • Indira Ghandi National Open University is in 11countries • The African Virtual University (AVU) serves more than 18 countries in Sub-Saharan Africa through multimode delivery of courses	• Increase share of overseas students (UK) • To make HE more accessible to remote communities (Sweden) • To integrate student university networks in Africa (AVU)
Tendency for policy makers to use market forces as levers for change in HE Driver: *Political; Economic; and Global Environment*	Cost factor may draw institutional strategic boundaries. Pressure to please the market and the industry (relevance), with a likelihood neglect of the advancement of pedagogical approaches.	• E-learning strategies implementation – driven by cost considerations rather than pedagogical motivations	• The adoption of ICT in the entire Australian university system (p9) is largely shaped by cost considerations.	• To improve quality in terms of delivery, administration, and pedagogical approaches. • To enter into new international markets (53% of commonwealth universities)

Source: Table constructed from data by Middlehurst (2003); Czerniewicz, et al, (2007)*

In summary, Table 1 clarifies the spontaneous uptake of educational technology by university in many countries. It further clarifies differences and similarities in circumstances that drive change towards ICT integration, and institutional reactions to the drivers and trends in European and Commonwealth universities. Whilst the educator perspectives links a C/LMS with learning enhancement in the previous section, survey findings in Table 1 suggest a wider combination of factors that drive ICT adoption within institutions. The survey also indicates that ICT initiatives are not entirely institutionally driven. Driving factors include a combination of public policy orientation, changing market forces, the globalisation of higher education, new technological innovations, students' demands, educator-innovativeness, and curriculum requirements. Investigations to the factors of ICT adoption in universities by Van der Merwe (2004), a similar survey of ten universities in the USA by the MIT in 2006 (Martin et al., 2008), and a national study on the meanings of e-Learning among the South African universities by Czerniewicz, et al. (2007), support these conclusions.

A variety of factors that drive institutional adoption of Web-based educational technology suggests a possibility of multiple uses. In other words, if learning enhancement is not the only driver and goal, but public policy orientation, market forces as well as competition and the technological innovations, then sensitivity to policy orientation, competition, emergent technologies and cost considerations may not be unexpected in implementations. In cases where these non-educational forces clash with pedagogical approaches, a threat to the fundamentals of learning strengthens. This thesis is concerned with the educational aspect of a C/LMS in so far as it is used to advance teaching and learning across pedagogical paradigms. As such, a threat to the educational component of C/LMS implementations is viewed with suspicion in this chapter.

Looking at the purposes for which universities use C/LMSs should offer some insight into this concern, however.

2.2.2 Patterns and Purposes of C/LMS usage in Academia

Dating back to 2003, the survey on 500 universities in Europe and the Commonwealth indicates that universities largely used their educational technology systems to

integrate academic and administrative services (Middlehurst, 2003). ICT facilities are being used to facilitate IT development and administrative support for faculties. On the educational aspect, Web-based learning systems are used to provide online teaching and learning to campus-based and to remote students (ibid.). No insight has been offered on the procedures followed and on the success rate in these efforts. Thus, C/LMS usage in these institutions can be described in terms of intentions rather than procedures and impact of learning.

In the study of ten universities[1] in the USA, Martin et al. (2008) report C/LMS usage growth rates of between of 136% to 522% at the University of Princeton, University of Texas and the Massachusetts Institute of Technology, among other institutions. The emphasis of usage in these institutions is purely on fostering independent learning. The idea, according to Martin et al., is to keep the role of the educator to the absolute minimum whilst students take maximum control of their own learning over an online medium. Other than the high rate of system adoption and usage for this purpose in these institutions in 2007, pedagogical linkages, procedures and impact of learning are not provided. Insight into the C/LMS impact on learning in these institutions is expected after the evaluative survey in 2011 (Martin et al., 2008). Until then, the initiative can only be gauged on the basis of the nobility of its intentions rather than the procedures and the success rate.

However, recent studies in Canada (CCL, 2009), the USA (ITC, 2008) and Europe (WEF, 2008; White, 2008) do offer unsubstantiated hints to a lack of impact in a number of C/LMS usage undertakings, with Bates (2009) suggesting that e-Learning is most probably failing in higher education institutions.

2.2.2.1 C/LMS and Academic Programs: The Status-Quo

The spontaneous adoption of e-Learning systems in Europe, according to the European Union (EU) Commission on Education, Culture and Lifelong Learning, has a

[1] The Massachusetts Institute of Technology (MIT) conducts surveys on the needs and emerging trends on C/LMS adoption and usage across academic institutions (on a five-year interval). In this instance reference is made to the survey of ten institutions in 2006: The Carnegie Mellon University; Stanford University; Columbia University; University of California, Berkeley; Harvard (College of Arts and Sciences); University of Chicago, Middlebury College; University of Texas at Austin; Princeton University; and Yale University (Martin et al., 2008).

financially ambitious undertaking (White, 2008). With the EU having spent over one billion dollars in ICT for education in the initial phases of its "Innovative Learning for Europe" programme, return on investment is awaited – with great anticipation. However, reporting at its annual conference in Lisbon in June 2008, the Director General of the commission, David White (2008), complains of a disappointing lack of a return on investment. The belief within academic institutions in Europe and among the EU policy makers is that "*ICT with its e-learning, distance learning, interactive potential offers the chance to develop a learning continuum, embracing formal, informal and non-formal learning. This may be coming, but it is not yet there. We need it*", complains White (2008:5). Despite the investment made, the expected "interactive and independent learning continuum" is disappointing, with the impact on learning yet to be realised in Europe. A lack of innovativeness on the part of educators is also raised as a major concern (ibid).

A lack of impact that current e-Learning practices have on learning is not limited to Europe. The Canadian Council on Learning (CCL), for example, concludes in its "State of e-Learning in Canada" report that whilst e-Learning adoption has grown in the country, it has not significantly altered the way universities organise and deliver learning (CCL, 2008). A further concern for the Canadian policy makers is that e-Learning is growing much slower than anticipated, raising fears that the country may be falling behind other countries in using C/LMSs to impact higher learning (Bates, 2009). In Spain, Sangra (2008) acknowledges isolated efforts by individual inspired instructors, but notes a lack of systemic coherence as a continued limitation to progress and change. In the United States of America (USA), Allen and Seaman (2008) report an impressive growth in the adoption of C/LMSs in academic programmes, but also voice a concern over a lack of notable impact. Similarly, the Instructional Technology Council (ITC) reports a "*widespread dissatisfaction with the results*" on the impact of e-Learning within the higher education system in the USA (ITC, 2008), a concern which is equally shared by Bates (2009). On a more global scale, the World Economic Forum Advisory Committee on Education also reports a bleak picture on the impact of C/LMS uses in global higher education curricula. Whilst ICT is expected to transform education in a number of ways, a significant impact according to the conclusion of the report, is yet to be noted (WEF, 2008).

Adoption of C/LMSs in universities across the globe is evidently growing. The literature also indicates an impressive rise in its integration with academic processes. Of major relevance to this investigation, however, are the operational details of its usage in teaching and learning. Clearly, the impact of C/LMS usage on learning has been limited. The situation is raising more questions than answers on the question: “how a C/LMS is, and should, be used to effectively support learning in academia”. Unfortunately, insight is lacking on the operational details of C/LMS implementation thus far. In a quest for insight (which is central to the question investigated in this study), the status of e-Learning within the South African higher system is interrogated further in the following section.

2.2.2.2 The patterns of C/LMS usage in South African universities

The thesis draws on the findings of pilot research by the author (Mlitwa, 2005), and related studies by Van der Merwe (2004), Czerniewicz and Brown (2005), America (2006) and Czerniewicz et al. (2007) on the factors of usage or non-usage of C/LMSs in South African universities. The pilot work of the author and that of America (2006) was built on the technology acceptance model (TAM) assumptions that individual acceptance of a technology is determined by the “Attitude” (A) towards using a technology. Usage is also determined by “Situational and Dispositional Variables”, “Perceived Usefulness (PU)”, “Perceived Ease of Use (PEOU)”, Behavioural Intention (BI)” and the “Actual Utilisation (AU)” (Davies, 1989). Whilst the TAM model is not used in this study, its terminology is embedded in the work being discussed, hence, it cannot be overlooked in this discussion. Situational and dispositional variables, which refer to attitudes (Warschauer, 2003 a), dispositions (Burbules & Callister, 2000), mental attitudes (Van Dijk & Hacker, 2003) and motivations (Harper, 2003) of a person (perhaps due to subjective norms) in favour of or against a technology, are said to encourage or hinder the likelihood of usage (Davies, 1989; Gefen, 2003). Similarly when the attitude is positive, an individual tends to believe in potential of a technology (PU) to enhance the realisation of a certain goal as an intention (BI) for the actual usage (AU).

A total of 6 576 students and 515 lecturers were surveyed across the four universities, the Cape Peninsula University of Technology (CPUT), Stellenbosch University (US),

the University of Cape Town (UCT), and the University of the Western Cape (UWC) in the first two studies.

2.2.2.2.1 Dispositional and Perceptual Factors of e-Learning in SA

Mlitwa (2005) as well as Czerniewicz and Brown (2005) investigated whether the students and academics considered a C/LMS to be important for teaching and learning (A & PU).

About the attitudes on technology generally, 71% of 6 576 surveyed students and 65% of the 515 staff reported a very high interest in new technology (Czerniewicz & Brown, 2005). With regard to C/LMS usage, 91% of students as compared to 82% of teachers indicated that technology adds high value to learning. In fact, over 82% of students and 80% of educators felt that Web-based computer solutions improve communication, with 93% of students and 86% of educators also saying that it offers valuable support to their teaching and learning processes. Similarly, 90% of students and 86% of educators felt that computers and the Internet help speed up their routines (Czerniewicz & Brown, 2005).

It is clear, therefore, that educators and students have very positive attitudes towards the Web-enabled teaching and learning technology in this sample of South African universities. When this is supported by favourable situational and institutional support in the form of a favourable policy, access, literacy and skills development should, in theory, encourage the use of C/LMS facilities in teaching and learning environments (Van Dijk & Hacker, 2003; Warschauer, 2003b).

2.2.2.3 Situational, Institutional Factors & e-Learning in SA

Situational factors refer the basic conditions (including the social environment and technical facilities) that are necessary to enable usage of ICT (Bates, 2005). In South Africa, all four universities have ICT policies. With regard to technology, all surveyed universities have one form of a C/LMS or another and various computer laboratories that are connected to the Internet, for access by students (Mlitwa, 2005). Further, over 69% of students (n=6 576) and all staff (n=515) were sufficiently satisfied with access to computers and the Internet (Czerniewicz & Brown, 2005). In a UWC case study, for example, Mlitwa (2005) found the university to be equipped with a number of computer

laboratories across the campus, all equipped with Internet access. Post-graduate residential rooms in this institution are also equipped with Internet networks. The only challenges reported at UWC pertained, firstly, to the closure of computer laboratories after hours and on weekends, as this limits access for students. Students also complained of printing costs and, lastly, poor bandwidth where slow networks were cited as a major frustration during peak hours (ibid.). These limitations, unfortunately, could have a negative impact on decisions to use computerised system in teaching and learning.

At CPUT (Bellville campus), educators complained of poor support or sometimes a lack of response from IT technicians within faculties (Czerniewicz & Brown, 2005). Similarly, 61% of the sampled student population said that computers were not enough, with major concerns raised by 82% of the UWC sample. Further, 46% of the sampled student population in the region felt that hardware/software was also inadequate (Czerniewicz & Brown, 2005; Mlitwa, 2005). In terms of the TAM prediction, this disruptive condition is likely to discourage usage of the technology system by the affected stakeholders.

Conditions, however, varied between institutions, with UCT and Stellenbosch reporting few concerns, with 77% of the UWC population raising more concerns on the adequacy (in terms of quantity and functionality) of hardware and software for learning. In general, students were divided about their ease of access to computers, with 63% to 74% at two historically disadvantaged institutions saying it was difficult or very difficult, compared to 67% to 88% of students at the other two institutions saying it was easy or very easy.

The level of computers and Internet access was much higher for educators across all institutions, both on- and off-campus, which means that access cannot be a hindrance against their use C/LMSs.

In terms of literacy (skill to use computer resources to teach or learn) 63% of the students rated themselves between good and excellent, with the highest frequency reported at the University of Stellenbosch. However, students were working at improving their skills, with 60% of the total sample (across all sampled universities) saying that they are attending some form of computer training. Though literacy

difficulties were not noted among the CPUT staff, at the University of Stellenbosch one academic said, "*I often have to help my colleagues, most of whom are less experienced than me, which can be quite time-consuming*", indicating a limitation in institutional literacy skills among some academics (ibid.). Whilst these complaints were minimal and merely reflected isolated experiences of particular respondents, the levels of institutional conditions in terms of facilities were, on average, adequate to enable reasonable usage of educational technology for teaching and learning in all sampled universities. It is the status and the intentions of C/LMS usage within the sampled universities that will offer a more reliable verdict on this prediction.

The behavioural intention (BI) and the actual usage (AU) of a C/LMS are discussed in the next passage.

2.2.2.4 Behavioural Intention (BI) vs. Actual Usage (AU) of C/LMSs

The status of computer technology usage (and purposes of usage) by academics and students in South African universities is presented in tables 2 and 3:

Table 2: Purposes of C/LMS Usage in SA Universities

Purposes for Usage of System	Daily	
	Students (n=6576)	Staff (n=515)
Communicate	37%	48%
Study	45%	
Access Information	45%	
Recreation	28%	15%
Teach		32%
Research		25%
Admin work		44%

Table created using data by Czerniewicz and Brown (2005)

Networked computers and C/LMSs, according to Table 2, are used by students to communicate, study, access information and for recreation. At the same time academic staff uses these facilities to communicate, teach, research, to administration (course-management work) and, to a smaller degree, for recreation purposes. However, the number of users (between students and staff) was generally below 50% of the total sample for each or all the purposes of usage (during this early phase in 2005). For those who use the facilities, it was mostly for e-mail communication (37% students and 48% staff), whilst only 32% of staff are using it for teaching, with only 44% of the staff using it for administration purposes. Table 3 outlines the patterns of usage per faculty, and by institution.

Table 3: C/LMS Usage per Faculty, per Institution

Institution	Science	Humanities	English	Business	Health Sciences
CPUT - CPT	11%	15%	30%	30%	N/A
CPUT – Bellville	3%	N/A	26%	18%	N/A
UCT	20%	24%	11%	16%	9%
UWC	32%	38%	29%	18%	60%
US	31%	21%	1%	16%	29%

Table based on Czerniewicz and Brown (2005)

Table 2 shows a bleaker picture in terms of usage patterns between and within faculties across all universities. The number of users is even smaller within faculties, which spells out a lack of coherence of standards within faculties. The obvious contradiction between the positive perceptions and satisfaction with access, on the one hand, and minimal usage on the other, is rather confusing. Hence this thesis seeks clarity on this contradiction.

In a separate institutional study of CPUT, it was found in 2006 that despite a number of educators in the faculty having gone on WebCT training, *"just a few used WebCT on a continuous basis and in a fully integrated manner with their teaching programs*" (America, 2006: 5). Further, all academics in the faculty are aware of the WebCT C/LMS, "*have access to regular training schedules…*" and believe that it is useful for teaching and learning (America, 2006: 95). Despite these claims by lecturers, America's interviews found their knowledge of WebCT to be very limited. Secondly, regarding educators who did not find WebCT easy to use, "*support staff in the faculty was not always available to assist lecturers implement WebCT*" (p.96). With regard to situational factors, top management and heads of academic units did "*not actively support or promote the adoption of WebCT in the faculty*" (p.96). In terms of perceived usefulness (PU), many academics who reflected optimism about the role and value of the C/LMS in teaching and learning were "*sceptical about the educational value of WebCT*" as a type of a C/LMS (p.97) and were therefore not using it. This case alone does suggest that limitations in situational and dispositional factors may hinder usage of the system that is believed to be useful (PU) in a faculty within an institution.

However, the policies and strategies clearly articulate procedures, support structures and the provision of facilities to leverage e-Learning. The institutional situational discrepancies, in turn, suggest a vacuum between these documented intentions and implementation. It is important, therefore, to gain a more detailed understanding of the possible causes in other institutions, which is the main objective of this thesis.

In conclusion, the course and learning management system (C/LMS) is a Web-enabled (Czerniewicz et al., 2007) educational tool. Whilst it has multiple uses, the key function is and should be that of facilitating learning (Kolas & Staupe, 2007) by means

of an interface between the user and learning objects ("Del cid" et al., 2007) across time and space. To be effective, however, the teaching community should identify the educational problems first, and then use such insight to inform technology solutions (Laurillard, 2008).

For the few academics that were using a C/LMS for teaching in sampled universities, usage was infrequent and for very limited purposes (Czerniewicz & Brown, 2005). Usage ranged from e-mail interactions, as well as the searching of information, notes and assignment examples on e-Learning sites by students, and PowerPoint presentation of content by lecturers (ibid.). Infrequent, incoherent and limited usage by lecturers, according to Laurillard (2008), clearly reflects a mistaken understanding of the sequential order of priority between technology and learning, often due to non-articulation of the most critical aspect of e-Learning, which is to start with the understanding of exactly "what it means to learn".

2.3 Understanding "What it Means to Learn"

It is clear in the literature that the goal of C/LMS usage in academia should, first and foremost, be to support and facilitate learning. Understanding how to facilitate effective learning in a technology-enhanced environment, according to Laurillard (2008), is a critical challenge for teachers and lecturers "*in every sector of education*" (p2). Whilst the goal is to maximize learning outcomes (Eom et al, 2006), the complexity according to Ritrovato (2008) lies in the fact that "*no two students are the same*" (Ritrovato, 2008). Students have different backgrounds, different styles and approaches to learning, all of which a technology solution should support (ibid.). Hence Laurillard (2008) calls for educators to first understand the nature of learning before applying a technology solution. Unless teachers first articulate exactly "what it means to learn", argues Laurillard, teaching over a C/LMS is less likely to enhance learning or, in the words of Eom et al (2006), to maximise learning outcomes.

Benjamin Bloom's taxonomy of learning domains are a starting point towards understanding the universal nature of learning. The taxonomy has also become a foundation upon which most learning theories' presuppositions are based.

2.3.1 Learning, from the Bloom's Taxonomy Perspective

Learning, according to Bloom's model, can be categorized into three domains where learning unfolds in a sequential order of competency levels (KrathWhol et al., 1964). The first domain (the cognitive domain) assumes the phases of the first encounter with knowledge. This encounter unfolds in sequential levels of learning, starting from the basic to the most advanced. The learning starts with a basic recognition (knowledge), followed by the understanding of the meanings (comprehension), which requires a lot of thinking. Thereafter, the learner can try to apply knowledge (application), then to analyze and, finally, perfect the skill to practically replicate knowledge (Anderson & KrathWohl, 2001).

Learning in the second domain (the affective domain) builds from the learning developed in the cognitive domain. It extends learning to the attitudinal and emotional development, where the learner develops confidence to openly receive, evaluate and engage the learning experience (ibid.). Building on the learning acquired in the first two domains, the final domain (the psychomotor domain) acknowledges the incremental growth, from the mere knowledge acquisition, and then from a confident understanding, where knowledge is engaged, into the more advanced "skill" level where the learning is translated into practical activities. In this case, the learner imitates and then manipulates or replicates. In the process, the learner fine-tunes the precision of their replications, to the extent of articulation by adapting and trying new things. Finally, the learner uses the skill naturally, as and when the need arises (Anderson & KrathWohl, 2001).

In understanding the three domains of learning, therefore, the e-Learning instructional designer is sensitized to incorporate all the supposed levels of learning. The instructional designer will also seek to present instruction in incremental levels, from the cognitive (knowing) to affective (attitude and confidence development) and, ultimately, to the psychomotor (practical skill precision) domains in his/her academic use of a C/LMS. Other than this insight however, the Bloom taxonomy model outlines the universal (rather than the specific) aspects of learning. As such it is not in itself a learning theory, but a broader guide to understanding a learner-conscious instruction across learning styles. In addition to Bloom's learning domains, it is still necessary that different learning styles are understood by educators if C/LMS-enabled learning

solutions are to be efficient (Ritrovato, 2008). In this regard, Gardner's (1983) multiple intelligences (MI), as well as learning theories under the behaviourist, the cognitive and the constructivist paradigms are further interrogated in the following section.

2.3.2 Understanding Different Styles of Learning

Just as backgrounds, interests, tastes and abilities between individuals differ, so are the learning capabilities, strengths and inclinations. As an example, Gardner's (1983, 1993 & 1999) theory of multiple intelligences identifies at least seven interest- and ability-related learning strengths between people. At the first instance is a person who is mentally stronger at memorising concepts. Identified as the "linguistic learner" (ibid.), this person is good at reading, writing and learns better by seeing, hearing stories and by saying words (Gardner, 1983; Armstrong, 2010). Gardner (1983) further identifies a person who excels in logic, problem-solving and in working with numbers as well as abstract patterns. Identified as the "logical/mathematical learner", this student learns better by experimenting, exploring relational patterns, asking questions and by discovering things (ibid.).

In the third category, the "spatial learner", who is stronger at visualizing, imagining, drawing, designing, building and in creating new things, learns better by solving puzzles, reading maps, charts, working with colours and images, and in experimenting with machines (Gardner & Moran, 2006; Armstrong, 2010). The "musical learner" in the fourth category excels in working with melodies, sounds, rhythms, music, and learns better by listening, exploring sounds and by playing an instrument (Gardner, 1983). In the fifth category is a "kinesthetic learner", who is stronger in physical activities and crafts. Because of this inclination, this person learns better by using physical energy such as moving around, touching, talking and by direct observations (ibid.). The people's person in the fifth category is referred to as the "interpersonal learner", because he/she is good at communicating and in understanding people. This student learns better by relating, cooperating and sharing with others. A direct opposite of this is an "intrapersonal learner". This student is more of an independent learner who excels in individual and self-paced projects. The intrapersonal learner learns better by working alone, by exploring and pursuing own interests (Gardner, 1993). Lastly, the "naturalist (nature smart)" learning strength, which acknowledges an

inclination towards nature, i.e. environment and farming, was added as the eighth learning intelligence in 2006 (Gardner & Moran, 2006). Limited uses of a C/LMS in South African examples clearly do not demonstrate consciousness of these differences in people's learning abilities.

Since no two students are alike, using the tools that support a single form of learning over a C/LMS is shortsighted and clearly limiting. With this warning in mind, a question as to how a C/LMS can be used to support all these learning strengths in one instruction therefore becomes logical. The answer is twofold. Firstly, people with similar interests, inclinations and strengths are likely to follow a common career, i.e. musically inclined learners are likely to pursue musical disciplines where a specific curriculum that is common to the group would be followed (Gardener & Moran, 2006). In this case, the medium of instruction to support a particular learning strength can easily be followed. At the second instance, Armstrong (2010: 6) strongly warns that none of these learning strengths or intelligences exists in isolation; they are always interacting with each other within a person (ibid.). Armstrong uses an example of cooking a meal to illustrate this point. The cook has to understand the recipe (linguistic intelligence), calculate the portions of the recipe (logical intelligence) and ensure that the meal is appetizing to others (interpersonal intelligence), etc. The logic in this example is that each online instructional medium should be varied in a manner that complements the facilitation of a number of learning abilities.

To explore practical measures to accommodate multiple learning strengths (or intelligences) into C/LMS usage, the behaviourist, the cognitive and the constructivist theoretical paradigms are interrogated in the following section.

2.3.2.1 The behaviourist paradigm of learning

Under the behaviourist paradigm, a learner is viewed as essentially passive, with learning taking place only in response to environmental stimuli. Learning theories under this paradigm move from the promise that a student starts off from a completely ignorant state (with no cross-reference point on the subject). In this instance, learning is argued to be transmitted directly from a teacher to the learner, through positive or negative reinforcements (Klein & Mowrer, 1989). In the traditional face-to-face classroom (objectivist model of learning) for example, a direct transfer of knowledge

from the instructor to the learner is the main goal (Leidner & Jarvenpaa, 1995). With the belief that knowledge is situated on the instructor and that it can be transmitted to students at different locations, behaviorists are even using virtual platforms to simulate a direct-knowledge transmission model instruction in distance learning (ibid). However, because of the very direct and unilateral nature of a direct transmission model, it is not likely to enhance Gardner's interactive, exploratory, experimental and discovery forms of learning. Given the "linguistic learner's" inclination towards reading, seeing and hearing on the other hand, the linguistic learner learns better under this paradigm. A number of variations in the behaviourist paradigm are offered in different behaviourist theories. The "classical conditioning" and the "social learning" theories offer a clearer insight into different behaviourist forms of learning.

2.3.2.1.1 The classical conditioning theory of learning

In classical conditioning, learning is triggered (conditioned) by the association of events in an environment. For example, a desired form of learning is associated with an event that stimulates a specific reaction on the learner. When the desired reaction is triggered, it is continuously encouraged (positive re-enforcement) until it becomes a habit (or is learnt fully). Punishing deviations from a desired response (negative re-enforcement) helps condition the learning only to intended knowledge or skill patterns (Pavlov, 1927). Using a C/LMS to support the learning strengths of a "linguistic learner" (Gardner, 1983), therefore, would require the basic transmission of the course material. Since the linguistic learner needs to see, hear, read and write, however, the use of text, images and recorded audio materials will enhance this learning intelligence. Further, as this learner is more of a passive recipient of knowledge, whose strength is in memorising and remembering things, it is the lecturer who mostly sends instructions and delivers content to the learner, and rewards or punishes poor performance. The learner does, however, need to submit work to the educator for the positive or negative re-enforcement.

This defines the features needed in a C/LMS. It also offers guidance on the possible prescriptions of its use, to support the learning strengths of a "linguistic learner", and other direct but passive forms of instruction.

2.3.2.1.2 The social learning theory

The “social learning theory” on the other hand, posits that people learn from one another, and from the social environment. Learning in this case is acquired by observing, imitating and modelling. This theory explains learning (and human behaviour) as a fraction of a continuous and reciprocal interaction between the cognitive, behavioural, and environmental influences (Bandura, 1997). The learning described under this theory will support all the learning intelligences that require social interactions, with various implications on the use of a C/LMS to support various learning styles.

2.3.2.1.3 Implications on a C/LMS and learning styles

Whilst the social learning theory speaks more directly to the learning strengths of Gardner’s “interpersonal learner”, a “linguistic learner” can also be an “interpersonal learner” (Armstrong, 2010) in that he/she may need to see things and hear stories (from others). Both intelligences will be emhanced by interacting with relevant social environments, as well as by hearing and observing the most knowledgeable others (MKOs). Mingling with individuals and groups to hear and learn from different sounds will also support the strength of a “musical learner”, though this learner will be let down by a lack of experimental provisions under this paradigm of learning. The same can be said of a “kinesthetic learner” who needs to participate with sport team-mates and coaches to learn more, but also need to experiment and practise.

Using a C/LMS to advance the social forms of learning, therefore, would require the use of the social interactive tools for group discussions and collaborative projects.

2.3.2.2 The Cognitive Paradigm of Learning

Contrary to the behaviourist presuppositions of learning, theories under the cognitive paradigm assume a more active involvement of a learner in the development of knowledge (Moreno & Mayer, 1999). Unlike a completely ignorant and passive learner assumed in the behaviourist paradigms, a cognitive learner is seen as a rational being who requires active participation and thinking in order to learn (Mayer & Moreno, 1998). Learning in this case does not start from a “clean empty state”, but builds on prior knowledge.

This paradigm appears to lean towards the learning strengths (or intelligences in Gardner's terminology) of the "logical/mathematical" as well as the "inter" and "intrapersonal" learners. The metaphor of the "mind as a computer" in Mayer's (2001) Cognitive Theory of Multimedia Learning, clarifies this link. Cognitive learning according to this metaphor follows a symbolic mental process marked by a "*change in a learner's schemata*" as incoming information is processed and translated into new mental images. Prior knowledge is used as a basis for selecting, filtering, organizing and the integration of information into new knowledge. Similar learning capabilities are identified with the "logical/mathematical learner" in Garder's (1999) theory of multiple intelligences. The logical learner has stronger cognitive abilities to process abstract patterns, work with numbers, experiment and to solve problems (ibid.). In exploring the practical ways of supporting this form of learning, the cognitive theory of multimedia learning assumes, firstly, that the auditory (voice) and visual channels of information coding and processing do enhance the mental cognitive functions. Secondly, that people learn "*more deeply from words and pictures than from words alone"* (Mayer, 2001: 47). Further, that the brain does not process the word, picture and auditory information in a mutually exclusive manner. It interprets all incoming information in a complementary manner, by actively creating logical mental representations or structures to make a coherent sense of it (ibid.).

The implication here is that instead of relying on the most knowledgeable other (MKO) for the meanings, a learner is assumed to take an active role in the interpretation and translation of information into knowledge. A lesson for C/LMS instructional designers is to acknowledge and support this learning aspect in their use of the online learning interface.

2.3.2.2.1 Implications on a C/LMS and learning styles

Mayer's Cognitive Multimedia Theory of learning offers insights into how multimedia tools can be used to enhance cognitive learning in a C/LMS. It further helps the educator understand the format in which multimedia tools should take to enhance cognitive learning. In this respect, the argument is that information must be presented in both the audio and visual formats, with words supplementing the images. However, people can only process a finite amount of information in a visual and auditory channel

at a time (Mayer, 2001), which means that learning will be hampered when the quantity and time of a multimedia presentation is overly extended. Therefore, a distinction should be drawn between the length and structure of the content that goes into a multimedia presentation on the one hand, and the ordinary notes that are presented over a C/LMS.

Finally, the very interactive description of cognitive learning assumes the necessity of interactive tools in a C/LMS. Because the “logical learner” and the “intrapersonal learner” in Gardner’s styles of learning have stronger cognitive learning capabilities however, supporting this form of learning will also need the use of individual problem-solving exercises, puzzles, charts and experiments. A C/MLS platform must also be fast, safe and flexibly accessible if it is to facilitate this form of learning. Obviously, the interpersonal learner can only benefit if the synchronous and asynchronous communication facilities are included, and effectively utilized in a C/LMS.

2.3.2.3 The Constructivist Paradigm of Learning

As a learning paradigm, constructivism represents the most dynamic form of learning. In direct contrast to how learning is understood under behaviourism, the constructivist learner takes an active role not only in making sense of incoming information, but also in the actual construction of knowledge (Piaget, 1977; Vygotsky, 1978). In this respect, learning is seen as an active knowledge-construction process, with the learner drawing on prior experience (Piaget, 1977). The constructivist paradigm is best suited to facilitating the participatory, the experimental, the exploratory and the discovery forms of learning. It is associated with higher cognitive learning capabilities in a “logical/mathematical learner” as well as the “interpersonal” and “intrapersonal” learners (Armstrong, 2010).

The Social Development, the Communities of Practice, and the Discovery Learning theories, offer a clearer insight into the constructivist styles of learning.

2.3.2.3.1 The Social Development Theory of Learning

Learning, according to the social development theory, is a function of prior knowledge, insight from social-interactions (Vygotsky, 1978), input from “the more knowledgeable

other" or MKO[2], and the student's ability to work independently in solving the problem (Crawford, 1996). Mental cognitive capacity develops involuntarily (Wenger, 2006) over time through social interactions first, and then at the individual level where one's brain makes its own interpretations (Vygotsky, 1978; Wertsch & Sohmer, 1995). In this account, the significance of interactive collaborations in learning is emphasized.

The main thesis of this theory is that knowledge is embedded in the social environment. Secondly, that there is always another person/s who are more knowledgeable than the learner, and that such knowledge can only be learnt by interacting with that knowledgeable other/s. Obviously, the cognitive creativity to make sense of information and to actively construct own meanings within a group, is underscored. Whilst the emphasis on the social interactions in the development of learning suggest a direct link with the strengths of an "interpersonal learner" in Gardner's (1983) MI theory, emphasis on cognitive development and its related inclinations suggests that other cognitive intelligences will also be enhanced by this approach to learning. After all, Armstrong (2010) reminds us that none of the learning strengths develop and operate in isolation. The social development of learning, therefore, cannot be viewed in isolation, but alongside other approaches. To this effect, the "logical/mathematical", the "intrapersonal" and the "linguistic" learning intelligences stand to benefit from social interactions.

Using a C/LMS to enhance the social development of learning, therefore, would require the social interactive tools. This will enable synchronous and asynchronous engagement between the learner, the environment (including content) and the knowledgeable others. Further, open access to wider social networks of peers and the more knowledgeable others, over a secure and fast platform that can handle a wider variety of data forms in a C/LMS, will enhance the social development of learning.

2.3.2.3.2 Communities of practice

According to the communities of practice (CoP) theory, regular interaction between "people who share a concern or a passion for something they do" (Wenger, 2006), helps them learn together how to do it better (Lave & Wenger, 1998). The learning

[2] The "more knowledgeable other" according to Piaget (1977), can be the teacher, a peer or anyone with more knowledge on the subject that the learner.

takes place when the members actively participate in a common practice, and continuously share experiences from their individual or collaborative activities (Lave & Wenger, 1998). The visibility of the role models and a drive towards the visibility of one's significance in the learning community is considered a major incentive for learning (ibid.). Since all the eight "learning intelligences" in Garder's (2006) MI theory have an aspect that requires "seeing" and "hearing" (Linguistic learner), "observe team mates and the coach" (Kinesthetic learner), hear "sounds and melodies" (Musical learner), etc., learning under this paradigm will enhance all learning styles.

For a C/LMS to enable this type of learning therefore, continuous access to best practices as well vibrant interactions with expert practitioners and one's peers, becomes significant. Integrating the social interactive tools in a C/LMS therefore, will facilitate this form of learning.

2.3.2.3.3 Discovery learning

Discovery learning according to Bruner (1967) refers to the style of learning where a student draws on past experience to discover new knowledge. A learner explores the surrounding context by interrogating controversies, manipulating objects and by experimenting to discover new knowledge (ibid.). Under the problem-based and the guided-learning models of discovery learning, the educator introduces the task, scenario or problem that learners should investigate or simulate independently. Serving as the MKO, the teacher will guide, probe, and validate progress.

The independence and the discovery aspects of this form of learning suggest that learners take initiative to interrogate information, to make sense and to learn. Emerging research suggest that such learning cannot be constrained to specific locations such as a fixed classroom, but takes place anytime and anywhere (Taylor, 2006) even as the learner is on the move (Kekwaletswe, 2007), hence the concept of "mobile learning" (O'Malley et al., 2003). Since the environment with or without mobile devices facilitate discovery of knowledge, continuous accessibility of learning content beyond fixed locations becomes a significant component of discovery learning.

The advantage of discovery learning is that students learn and remember concepts, relationships and facts much better if they discovered it on their own than when taught

(Bruner, 1967). Ensuring a synergy between the programmes, features and functionalities of a C/LMS, and mobile devices such as mobile phones, therefore, will enhance discovery learning.

2.3.3 Conclusion on the Meaning of Learning

The use of C/LMSs to enhance e-Learning must be informed by a clear understanding of learning itself (Lorrillard, 2008).

The taxonomy of learning domains offers a universal framework to understand the phases and categories of learning across styles. Gardner's multiple intelligences (learning strengths) and cognitive inclinations on the other hand, offer a more specific insight into different abilities and styles of learning. The main argument of the section is that just as no two learners are alike, so are their learning capabilities, strengths and styles. The conclusion thus, is simple: rigid use of a C/LMS to facilitate one and ignore other learning styles should be avoided.

Different pedagogies and learning theories support different learning strengths and styles, meaning that learning styles are all significant in their respective rights. Thus, combining all possible strategies and tools to support different learning abilities (intelligences) in a C/LMS becomes crucial. With respect to discovery learning in particular, extending accessibility of a C/LMS into mobile technology devices and social network innovations – to support mobile discovery of knowledge, is therefore emphasised. Understanding critical characteristics and structure of what should be an empowering C/LMS, thus, is as important as the understanding of the meaning of learning itself.

2.4 Purpose and Structure of a C/LMS

Educational technology such as a C/LMS adds value to learning in many ways. According to the survey on university students in South Africa, a C/LMS is useful when it enables interactive learning, flexible communication, online submission of academic tasks, and the convenient access to learning content (Mlitwa, 2005). It is considered educationally significant or insignificant, depending on whether it is used for administrative (insignificant) or for interactive instructional (significant) activities

(Landon et al., 2006). Significant activities according to the MIT survey of ten universities[3] in the USA include the delivery of content as well as the holding of interactive discussions and synchronous events etc. (ibid.).

Educational technology experts at the universities of La Trobe[4] in Australia, the Oxford University's London Knowledge Lab (LKL) and the Central University of Dublin, further emphasise the significance of flexible access[5] (McKeogh & Fox, 2009) and the problem solving aspects of an online learning environment (Laurillard & Materman, 2009). Above all, the central purpose of a C/LMS should always be to improve the learning experience of a student (Czerniewicz, et al. 2007). Obviously, university institutions also use a C/LMS to advance other secondary objectives. To this effect, university mission statements list the pursuit of the quality of teaching, learning, scholarship and enquiry (CPUT Online, 2009; UCT Online, 1997), and the delivery of lifelong learning (UWC, Online, n.d.) as priority areas of improvement.

In this respect, a balance between administrative and academically significant functionalities (and the efficiency of these functions) in a C/LMS, thus, becomes important. Together with this insight, the need to facilitative multiple styles of learning suggest five minimum conditions that are necessary to improve the educational significance of a C/LMS. These are: Accessibility (A); Efficiency in terms of speed and precision (E); Flexibility (F) in terms of enabling multiple tasks over one system across time and space; the safety and security (S) of the platform; and a systematic coherence (C) between goals, the software, content, procedures, skills and practices.

2.4.1 Characteristics of an Educationally Significant C/LMS

The five minimum conditions (the A, E, F, S and C) for the educational significance of a C/LMS also enhance effective communication across time and space, and simplify

[3] In 2006, the Massachusetts Institute of Technology (MIT) conducted the survey on the emerging trends of C/LMS adoption and usage across: The Carnegie Mellon University; Stanford University; Columbia University; University of California, Berkeley; Harvard (College of Arts and Sciences); University of Chicago, Middlebury College; University of Texas at Austin; Princeton University; and Yale University (Martin et al., 2008).

[4] The learner's 24hour, seven days a week access from any connected place, motivates the use of a C/LMS at the University of La Trobe (Johnson, 2009).

[5] The synchronous interactive capabilities, which enable one to study at any university from own homes, has encouraged C/LMS adoptions in UK traditional universities (McKeogh & Fox, 2009).

course management. The significance is clear in the attention the criteria receive in many studies, and in educational (Johansen, 2001; Jerz, 2003) as well as in technology-related (Rosswall, 1999; Mlitwa, 2005) conferences. Studies by Squires (1999), Feldstein (2003) and Miller (2005), for example, emphasise access to and accessibility of ICT. Similarly, studies by Purcel and Grant (2004) and Allan (2002) strongly argue for flexibility and usability of a networked technology. The security (S) aspect, however, spreads across all these criteria. Flexible access, for example, depends on the safety of the network and whether rights to access data are adequately controlled. Conversely, flexibility is threatened by unauthorised access, uncontrolled spamming, unwelcome viruses and worms (Tang & Chen, 2005). I have drawn on various literature to compile the commonly accepted features of C/LMS usefulness in Table 4.

Table 4: A Literature Based Description of an Ideal C/LMS

Key Capabilities	**Benefits/ Value added**	**For*** T, L	**Necessary Condition/s**	**Category**** A, C, E, F, S
Facilitates easy access to learning facilities	Fast, convenient & efficient access to lecture notes, lecture presentations, reading material, and other learning content, at the touch of the button and while sitting at one point.	L	For a C/LMS to offer these capabilities, it should be connected to the internet, and to all the necessary learning and reference materials – for 24 hours, 7 days a week, 365 days a year. It should also be embedded with safety features to prevent unauthorized intrusions or threaten the normal flow of functionalities.	A, C,E,F,S
Facilitates flexible communication & interaction across time & space	Enable text, audio and picture information exchanges between one or more parties regardless of time and space. Enables group discussions, online collaborations, and immediate response from lecturers and groups in separated locations.	T, L	C/LMS should have synchronous & asynchronous communication features to bridge distance & time limitations, & to enable group discussions. Convergence with mobile technology facilities & social network system, a C/LMS should also have picture, text and voice handling facilities to enable different formats of information exchanges. This should be supplemented by adequate bandwidth. Safety features should ensure that communication is limited to authorized parties.	A,C, E, F, S
Simplifies course management	Helps manage learning activities, i.e. load course content & define access rights to content. Helps track & guide progress through text or chat interaction.	T	C/LMS should have a storage facility that can handle audio, picture, text, and the general electronic multimedia data. An appropriate Content Management System (CMS) which is a collection of procedures (and software) to manage workflows in a collaborative environment (Amato, et al, 2004), becomes a significant part. For this, adequate bandwidth is needed. Security is essential to control access and to protect content.	A, C, E, F, S
Simplifies assessments	Enables online assessments (exams and tests), as well as submission & marking of assignments. Simplifies marks administration.	T, L	C/LMS need features & software to handle short & long question–type assessments (enable uploading, downloading, marking, and the reporting of test, exams, & assignments). Security to ensure assessment integrity.	A, C,E, S
Facilitates flexible learning	Students get more control over learning processes, improve learning outcomes & maximize student engagement	T, L	C/LMS should be designed with interactive features, including chat-rooms and social network systems. It must also be embedded with flexible pedagogy, without compromising the integrity of the learning content, learning process and the privileges of registered learners.	A, C, E,F, S

Explanatory Notes: *** L** = Learner; **T** = Teacher. **** A** = Accessibility; **C** = Coherence; **E** = Efficiency; **F** = Flexibility; **S** = Security

Table 4 reflects a general agreement in the literature concerning the minimum capabilities that a teaching and learning technology needs to have if it is to offer an additional educational advantage over traditional non-technology assisted formats of education. A C/LMS according to Table 4 should at least facilitate and simplify:

- Access to materials,
- Flexible interaction and communication,
- Management of course materials,
- Online assessments,
- Flexible learning.

The effectiveness of an e-Learning system is determined not only by a mere presence of technical facilities alone, but also a dynamic interplay between human and technical design factors (Piccoli, et al, 2001). In this respect, human factors would refer to individual aspects of a student and lecturer (Arbaugh, et al, 2009). These factors include self-motivation, self-efficacy, confidence (Bandura, 1994) and learning styles for students, as well as the instructor traits, including the ability to flexibly transition between teaching philosophies (Eom, et al, 2006). Technical design factors on the other hand, refer to the more abstract aspects of e-Learning such as the technology (hardware and software), course content, actual interaction between the learning parties and the content, and the control a student has on the learning process (Piccoli, et al, 2001).

An argument of this section is that technology improves efficiencies in teaching, learning and in course management, in that more can be done with less. For example, universities can attract and serve more students (Gultig, 1999) without increasing the number of educators, and without compromising the quality of education (Mlitwa & Van Belle, 2010). However, improving learning efficiencies and ultimately, learning outcomes should always be the central goal of C/LMS usage (Eom, et al, 2006; Czerniewicz, et at, 2007). To achieve this, Alavi and Leidner (2001) recommend a careful balance between ICT tools, instructional strategies and psychological processes in instructional environments. In this respect, Peltier, et al (2003) suggest

the embedding of a C/LMS teaching components for instruction and mentoring, that support interactions between teaching and learning parties, as well as the functionalities that enhance the structure and content of the course. Most importantly, however, educational technology should be determined by pedagogy, and not vice versa (Laurrillard, 2008).

Learners have different learning strengths and inclinations (Gardner, 1983). However, none of these learning strengths (intelligences) and inclinations exists in isolation from each other (Armstrong, 2010). Each of the learning strengths (and styles) makes reference to, and is supplemented by one or more of the others, hence using a C/LMS to advance one learning style at the expense of the other, would be short-sighted. Instead, a C/LMS needs to cater for the behaviourist, the cognitive, and constructivist paradigms of learning. A network-based system with flexibility to handle the storage and exchange of multiple forms of data across various contexts, time and locations, both synchronously and asynchronously is suggested.

To make operational sense, the characteristics of a C/LMS in Table 4 are translated into four logical components (institutional goals, people, means and rules) in Figure 4:

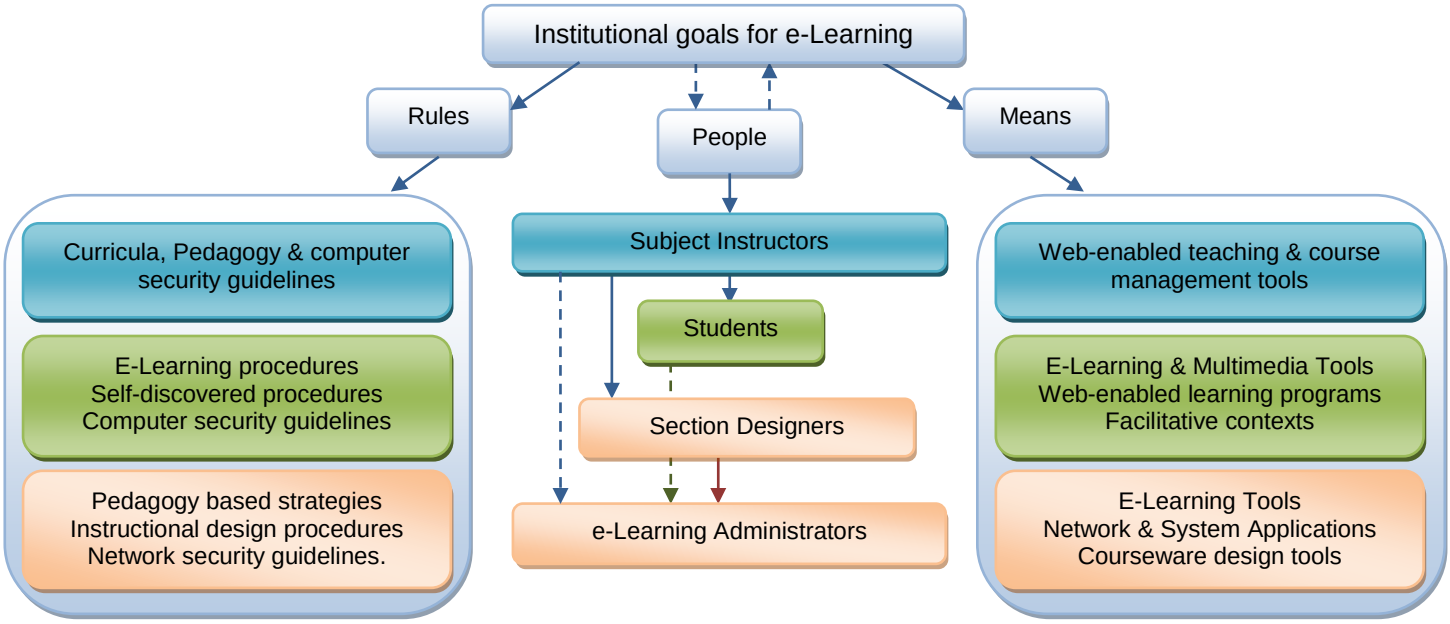

Figure 4: Components of a C/LMS

e-Learning should, first and foremost, prioritise the optimization of learning outcomes (Eom, et al, 2006). Whilst effective learning is closely related to student satisfaction, learning outcome refers to the actual impact the student takes out of (and away from) the learning process (Arbaugh, et al, 2009). Determinants of e-Learning outcomes include the student's own personality characteristics (Scniederjans & Kim, 2005) that in turn, influence their learning style. Determinants of learning outcomes also include the student's self motivation (Smith, 2001), interactions between instructor and learner (Arbaugh & Rau, 2007), the instructor's facilitation skill (May & Short, 2003), pedagogy (Laurillard, 2008; Leidner & Jarvenpaa, 1995), the quality and efficiency of the actual technology (Freeze, et al, 2010) as well as skill and self efficacy (or confidence) with the use of a computer (Chiu & Wang, 2008). To be successful however, these determinants of learning outcomes however, should be embedded in, and implemented through, the components of a C/LMS as outlined in Figure 4.

In conclusion, since students have different capabilities and styles of learning, educators should start by understanding the meaning of learning before deciding on how to use a C/LMS. That is, a linkage between learning objectives, pedagogy and learning styles should be reflected in the features, tools, and purposes of a C/LMS. The characteristics (Table 4) and the components (Figure 4) clarify the educational purposes of a C/LMS; emphasizing that a C/LMS should support not just one but all learning paradigms. What is left to clarify are the operational dynamics of using a C/LMS within or between pedagogical paradigms. In fact, disagreements are rife between the proponents of the constructivist and behaviourist paradigms on how a C/LMS should be used, with the majority arguing that a C/LMS is educationally significant only when used within the constructivist paradigm. In the quest for clarity, the constructivist versus behaviourist pedagogical dilemma is interrogated, categorically so, in section 2.5

2.5 The Constructivist - Behaviourist Dilemma of a C/LMS

The argument in previous sections is that a networked C/LMS should at the very least enable (a) independent learning; (b) collaborative learning; (c) flexible learning; (d) interactive learning; and (e) effective communication. Most authors often combine these phrases to present constructivist learning as a defining characteristic of e-Learning. On the surface, the arguments suggest that e-Learning, constructivist

learning, and the high quality of education (as measured in optimum learning outcomes) are three sides of the same coin. On closer examination however, “three” sides in any coin seems peculiar, reductionist, and therefore, suspicious. The position of this thesis instead, is a blended approach to teaching and learning strategies. To build this argument, constructivism and behaviourism concepts are examined closely in the following paragraphs.

In effect, constructivist approaches offer numerous advantages to learning. Enabling a learner to “find his own path”, to “continue in it”, so that he can assume “a scientific attitude”, for example, suggests that a student learns to do more than just constructing knowledge. A student further develops the mental capacity to engage information independently of facilitated environments later on in life. Within this paradigm, independent learning is closely associated with experiential learning (Kolb, 1984), where the learner makes his/her own discoveries, interpretations of knowledge, and plays an active role in the development new meanings. However, these advantages do not necessarily imply the absolute uselessness of every non-constructivist method. The blending of different aspects of learning approaches in the use of C/LMSs (as informed by the understanding of what it means to learn) is suggested in this thesis.

The characteristics of the two approaches, the merits of the constructivist and behaviourist (instructive) pedagogical paradigms are outlined in Table 5.

Table 5: The constructivist vs. behaviourist (instructive) models

	Constructivist Model	**Implications**	**ICT & e-Learning as an enabler**	**Instructive** (Knowledge transfer) **Model**
Defining Characteristics (Social + Cognitive)	Interactive & discovery learning (Paiget, 1977; Vygotsky, 1978)	Active participation; Deep cognitive engagement & independent discovery	Challenging tasks online – requiring initiative. C/LMS use for content (information banks, data-bases, encyclopaedias), tests & related games	Direct instruction, Guided practice, corrections and occasional reviews (Skinner, Thondike, Conway).
	Social collaborative learning (Piaget; Vygotsy)	Work with others: group work, class discussion	Online real-time discussion rooms, chart rooms, group e-mails are standard for most C/LMSs (constructivist).	C/LMS used to give direct instructions to individual students, across time & space.
	socially mediated learning (Vygotsky)	Social (society, family, culture, language, industry, etc) & environmental frames of references influence learning.	Existing social frames of reference inform the construction of knowledge. Learning is modelled around social settings, i.e. group projects over C/LMS discussion forums.	Knowledge is situated with educator and the environments of practice, hence the apprenticeship notion. C/LMS used for revisions, replication tasks & feedbacks.
	facilitated learning (Rodgers)	Teacher/ Lecturer is present to guide, not to dominate.	Educator important in both models. A C/LMS supports both mediums.	Teacher takes the centre stage. C/LMS conveys teacher versions of knowledge.
	Computers in learning (Papert, 1980)	interactive presence, unlimited access.	C/LMS come in formal languages of learning. The www is accessible for 24hrs, with audio & visual communication capabilities to support both models of learning.	Learning content should be accessed for memorising & replication. C/LMS is a content storage & a communication medium.
	Independent/ experiental learning (Rodgers)	Do tasks on your own, at your own time & pace. Self directed learning.	Unlimited access to content, exercises & frames of reference.	Independent practice of a task teaches a student to internalize practice instructions. Tasks can be set for repetitive practice.
	discovery learning (Bruner, 1986)	Try new things, test what you know to find new meaning.	Access more information than needed for current tasks. Through web based LMSs you can search other fields, find additional examples & try own tasks, etc, to expand learning.	Educators use C/LMS to transmit structured, predefined and factual content to learners, who simply memorize facts.
	continual (lifelong) learning (Conway, 2007)	Discover & build new frames of reference, new skills to process further information.	As you process own information, you develop skills to process further information independently. Educators can flexibly arrange online content for this objective.	There is very little said of life long learning under this model.
	Project type Learning(Dewey, 1897, 1938)	Take initiative, be inquisitive, do it yourself.	Educators can use e-Learning to for high cognitive tasks that require initiative, i.e. physics or simply just in the behaviourist (instructive) mode as a transfer of learning content	Active reception of information from instructor. Giving feedback to demonstrate understanding
	knowledge constructed (not transmitted, not reproduced) (Piaget; Vygotsky)	Drawing on **experience**, social influences & environment, to translate information & to construct new meaning.	LMS content as source of reference; engage classmate online; The transmission model: access lecture notes online, do repetitive tasks, quizzes, tutorials, send messages to the instructor	Knowledge situated on instructor & practice environment.

Table 5 shows convergence between technology as an enabler of participative, active and independent learning and the defining characteristics of constructivist learning. As a pedagogical paradigm, constructivism helps clarify the development of knowledge in a learning context such as a lecture or classroom, mediated or independent environment and the group activity (Tobin, 1993). It draws on the psychological understanding of the roles that the society plays in the cognitive development of the individual (Vygotsky, 1978). Social constructivism in particular, is also based on the sociological notions of how the individual, social group/s and social structures, as well as social formations instil certain experiences (deemed to be educational) in individuals (Salomon & Perkins, 1998).

Collaborative learning, where the educator acts as a facilitator for (presumably, not a transmitter of)[6] learning, while learners actively take part in constructing their own meanings, is also assumed (Wheatly, 1991). Since the educator is expected to stimulate students' thinking through real-world problems (Gokhale, 1995), and by creating an environment for class discussion, group projects etc. (Wood et al., 1995), direct instruction, which is often downplayed in this paradigm, remains significant. Again, the exaggeration of collaborative as well as independent and exploratory aspects of learning, which leads into a trap of dismissing everything that is behaviourist; thereby "*throwing away the baby with the bath water*" (figuratively speaking) often leads to constructivist techniques being declared as "one size fits all" solutions. However, Gardner (1999) warns against this naïve error in judgement, arguing that as no two learners are similar, a single mode of instruction is appropriate the advancement only of some and not for all learning intelligences.

As Table 5 shows, educational technology is equally significant for learning in non-constructivist pedagogical models as well. Hence the blending of various pedagogical approaches in an e-Learning instructional design is suggested in this thesis.

[6] Educators should merely show the learner (or student) "*the direction in which to go, to teach him to find his own path, to retrace it, and to continue in it. Only in this way will he be able to assume a scientific attitude with which he can approach also the things of the mind*" (Von Glaserfeld, 1989: 12)

2.5.1 Towards the Blended Approaches to Learning

> ‘‘failure to learn is not a measure of the inherent capacity of the learner but a reflection of learning systems (some part of the systems, such as materials, strategies, policies or infrastructure) that fail to address the needs of all learners” (Moore, 2007: 522).

The view of blending pedagogical paradigms in an e-Learning platform is supported by leading scholars in technology-based instructional design, including Koschmann (1996), Rose and Meyer (2002) as well as Moore (2007), among others.

Koschmann outlines four paradigms that highlight different roles played by ICT in teaching and learning: (1) Computer Assisted Instruction paradigm (CAI); (2) the Intelligent Tutoring System (ITS) paradigm; (3) the Logo-as-Latin paradigm; and (4) the Computer Support for Collaborative Learning paradigm (CSCL). That is, instead of looking at C/LMS as a platform for, and an enabler of either a constructivist or behaviourist (instructive) teaching and learning, Koschmann’s (1996) paradigms are adopted to construct an inter-pedagogical technology model in Figure 5.

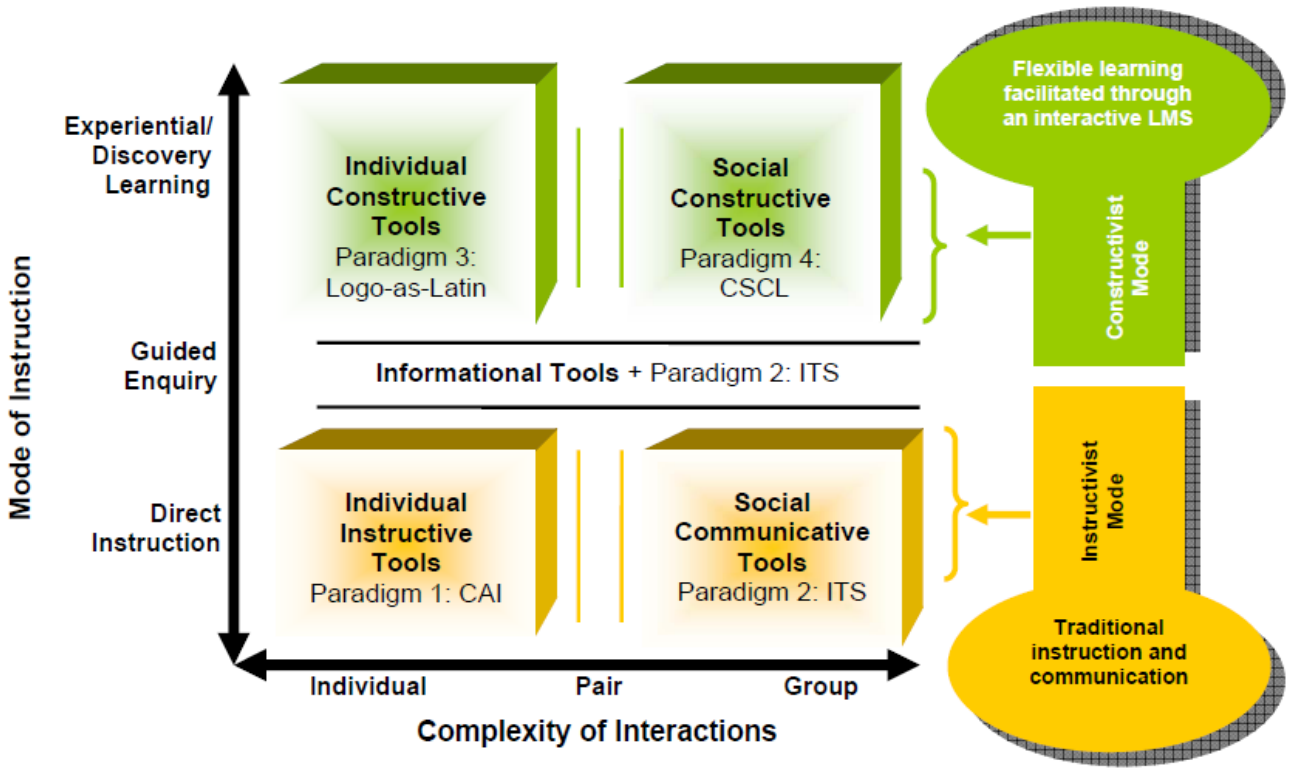

Figure 5: Mode of Instruction, Learning, and Related Instructional Tools

Since ‘‘... *the barriers to learning are not, in fact, inherent in the capacities of learners, but instead arise in learners’ interactions with inflexible educational materials and methods’’* (Rose & Meyer, 2002: p. vi), digital technology should be used to reach and to “*teach every student*” (ibid.). In other words, when inflexible platforms fail to cater for all learners, they may instead hinder learning (Moore, 2007). Thus, the universal approach to designing e-Learning platforms (flexible interoperability across pedagogical paradigms) and modes of instruction could help educators attend to different learning styles and needs (Rose & Meyer, 2002).

Figure 5 illustrates the four modes of teaching and learning through technology, the CAI, the ITS, the Logo-as-Latin, and the CSCL paradigms. The four paradigms applied across the “discovery learning” in the constructivist pedagogical paradigm, the “direct mode of instruction” in the behaviourist (instructive) pedagogical paradigm and “guided learning” approaches.

Paradigm 1: Computer Assisted Instruction (CAI) and Individual Instructive Tools

Under the instructive model, the teacher uses individual or group instruction tools (including ICT tools) to transmit knowledge to the learner. According to behavioural psychologists, such as Skinner, behaviourist (instructive) educators follow the stimulus/response model of teaching – to determine all skills needed to lead up to the desired behaviour in a learner. They structure specific steps that must be followed strictly by a student in order to learn the skill (Roblyer et al., 1997). In this model the teacher would typically "*present new material*, *do daily reviews*, *enable guided practice*, *allow independent practice"*, then administer "*corrections and feedback"*, as well as conduct "*weekly and monthly reviews"* on the performance (Rosenshine, 1986). Instructivist lecturers, therefore, are likely to use a C/LMS towards these ends, in any combination or order.

Contrary to the constructivists' objections, the transmission model has been shown to be particularly effective in the "*teaching of mathematical procedures and computations, reading decoding, explicit reading procedures such as distinguishing fact from opinion, science facts and concepts, social science facts and concepts, map skills, and foreign language vocabulary. They are less relevant for teaching in areas that are less well-structured, for example, teaching composition, reading comprehension, analyzing literature or historical trends*" (Rosenshine, 1986, p.60). Differences in learning strengths, inclinations and styles (Gardner, 1983; Armstrong, 2010) also point to the usefulness of this mode of instruction as a facilitator of learning in the linguistic intelligence. For these purposes, a C/LMS can be an instruction support tool in paradigm 1 (CAI), without necessarily having to subscribe to the notions of constructivism. In this case a C/LMS should be configured to help the learner locate and recognise "*information to be learned"*, enable the *"application of strategies to process that information",* and to facilitate the individual's *"engagement with the learning task*" (Rose & Strangman, 2007: 282). Figure 6 illustrates the typical behaviourist (instructive)-based individual learning tools in an advanced C/LMS.

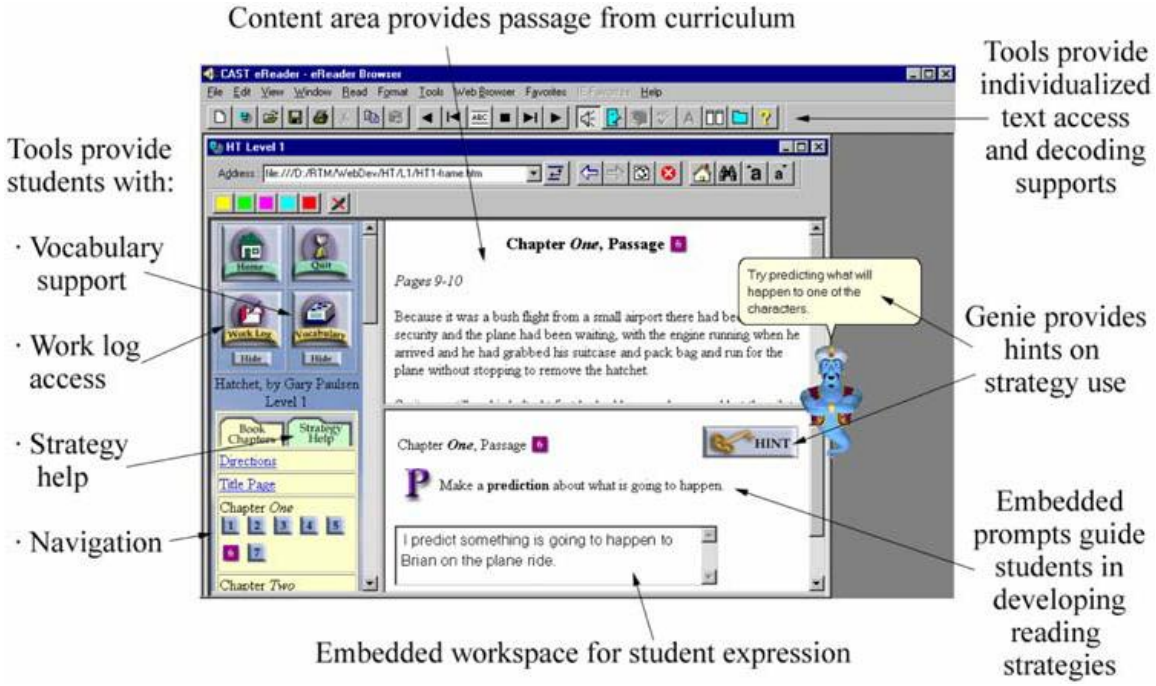

Figure 6: Individual Learning Tools in an Advanced C/LMS

Source: Rose & Strangman, 2007: 388

The focus in this learning paradigm is on the learning content, and on getting it to the individual learner who must memorise and reproduce it. Examples of behaviourist (direct teaching and learning) tools under the CAI paradigm would include content storage, retrieval and navigation tools as well as the mail, notice-boards, announcement facilities as well as assessment and task submission tools in a C/LMS.

Paradigm 2: Intelligent Tutoring System (ITS) and the Social Communicative Tools

The ITS paradigm falls under the cognitivist pedagogical framework, which holds both the behaviourist (knowledge transmission) and some constructivist convictions of learning (Mayer, 1999). Within the behaviourist framework, the ITS paradigm emphasises interactions, where a C/LMS facilitates communication between the teacher and the student or group/s (intra and inter-group) (Koshmann, 1996). As an instructivist model, the ITS advocates direct transmission of knowledge, but is unlike the CAI paradigm which focuses on the individual focuses on direct instructions of

groups. In this case, group projects and flexible communication between the lecturer and the groups, is emphasised (Lund, 2003). Synchronous and asynchronous communication spaces and group broadcast messages in a networked PC or cell-phone would be used as social communication tools (including social network tools) under the ITS paradigm. The ITS paradigm seems to fit the learning strengths and style of Gardner's (1983 & 1999) interpersonal learner intelligence in the Multiple Intelligences (MI) framework. The point once again, is that a C/LMS and related interactive technologies are useful in facilitating not one but different styles of learning.

Paradigm 3: Logo-as-Latin and the Individual Constructive Tools

The third paradigm, Logo-as-Latin, advocates the thesis of active construction rather than the transfer of knowledge over a C/LMS. The focus in Logo-as-Latin (or individual constructivism) is on independent and experiential learning (Koshmann, 1996) learning. The individual learner finds his/her way through a C/LMS environment where he/she engages in new experiences, explores and reflects on information to construct new knowledge. Further, the learner interprets, accepts or rejects information, and adds own meaning to the knowledge encounter. In view of Gardner's MI framework and different styles of learning however, the relevance of the Logo-as-Latin to the strengths of the "intrapersonal learning" style (Gardner, 1983) no longer discounts the relevance of other modes of instruction. Instead, it merely highlights the relevance of the features in a C/LMS and other instructional technology that would facilitate the individual constructivist form of learning.

Paradigm 4: Computer Support for Collaborative Learning (CSCL) and the Social Constructivist Tools

Lastly, the CSCL paradigm views learning as a context-situated and a social process. This constructivist paradigm of learning advocates a similar level of learner engagement with the construction (rather than passive receipt) of knowledge as advocated in the Logo-as-Latin paradigm. It is similar to the Logo-as-Latin paradigm, except that the group rather than individual effort is emphasised in the CSCL. In its description, CSCL seems to fit the learning strengths of the interpersonal learner within Gardner's (1983) learning styles. The CSCL paradigm, thus, is likely to

emphasise the interactive collaborative uses of ICT, where a C/LMS is used within the social and collaborative context to facilitate learning.

In conclusion, this section demonstrates the relevance of a C/LMS in supporting not just one but various learning styles, across all pedagogical paradigms. The conclusion is that a C/LMS should not be reduced into a vehicle for the delivery of a single, but all pedagogical paradigms. C/LMS uses, therefore, should be determined by the capacity (or perceived capacity) of its features to facilitate discovery learning, guided learning (constructivist learning), or the direct instruction mode (behaviourist learning).

In any mode of instruction however, system usability remains central to successful usage of a C/LMS within various paradigms.

2.5.2 Technology Usability Considerations of a C/LMS

Insight is drawn from Bojko (2006), Sheng-Cheng Huang (2006), Kreitzberg (2006), and Martin et al. (2008) case studies, to clarify highlight technology usability considerations for C/LMS implementations in Table 6.

Table 6: Technology Usability, Usefulness (PU) and Ease of Use (PEOU)

Case Study + Technology Type	Purpose of Case Study	Criteria per Case Study	Meanings/Implications for a C/LMS
Using eye-tracking to compare web page designs (Bojko, 2006)	Comparing user-friendliness of two web designs	- enable goal achievement - enable efficiency - ease of use - meet user needs/ expectations	- Determinant of success or failure - Improves processes to the final goal - Does not add unnecessary physical strain convenience compromises
Empirical evaluation of a popular cellular phone's menu system: theory meets practice (Sheng-Cheng Huang, 2006)	Determine effectiveness, efficiency, & user satisfaction of a cell-phone's menu system	- effectiveness - efficiency - user satisfaction - accuracy - clear labelling & descriptions - meet user expectations - compatible with intended task	- Enable successful goal achievement - Saves time, works fast, reliable - Users say it satisfy needs - Reliably does what it is intended to do - Relevant. No unnecessary user-adjustments
Can collaboration help redefine usability? (Kreitzberg, 2006)	Opens debate on collaboration of related information for easy access, reference & use	- collaborated knowledge bases - single entry-points to knowledge	- Information fragmentation complicates usability - Information Collaboration improves cross-discipline interaction
Compare usability compliance between C/LMSs: Moodle, Sakai and dotLRN – from a student tasks user perspective. (Martin, et al, 2008)	Test asynchronous learning support functionalities of e-Learning platforms	Using Nielsen's (1994) 10 Heuristics*, case determine: - Visibility of System Status - Match Between System & the Real World - User Control & Freedom - Consistency & Standards - Enable diagnosis & recovery from errors - Error prevention - Recognition rather than recall - Flexibility & efficiency of use - Aesthetic & minimalist design - Help & documentation	- System must enable goal realization, flexibly & efficiently - System errors hinder usability - Complexity limits user control, thus ultimately discouraging use - System be relevant & practical to real world situations - Minimalist design, consistency & standards for users to easily find features. - Users should not feel lost or stranded when facing a problem at any time.

Reconstructed to reflect the findings of the case studies: Bjoko (2006); Sheng-Cheng Huang (2006); Kreitzberg (2006); Martin et al, 2008.
* Heuristic evaluation (Nielsen, 1994) is an engineering method to find usability problems in user interface designs - for rectification during iterative design processes.

Discovery learning is not confined to fixed locations, but also extends to mobile contexts, anytime and anywhere. For learning over mobile environments therefore, interoperability between a C/LMS and mobile devices becomes empowering. Computer usage in educational environments however, can be a daunting task when the system is difficult to learn, and technically sophisticated to use (Kluge, 2003). In

effect, technology according to Table 6 should not impose unnecessary strain upon the user, either physically, emotionally or intellectually (Melton, 2006). Instead, system interfaces should be as understandable and as simple to use as possible. Users should feel that it meets their needs and expectations (Bjoko, 2006).

Terms used in all case studies present an instrumentalist perspective of technology as a somewhat neutral tool (Feenberg, 2003) whose purpose is to satisfy user-ends. In the first case study, Bjoko (2006) used the eye-tracking methods to test and compare the user-friendliness of the two web-platform designs in 2005. Usability in terms of the criteria used, implies that a web-based system should enable goal achievement, enable efficiency, meet user expectations and primarily, be easy to use. In the second case study, Sheng-Cheng Huang (2006) compares the theoretical and practical aspects of a cellphone menu to evaluate usability. Again, the findings suggest the significance of the minimalist design (practical simplicity), relevance to task, accuracy and efficiency as the major determinants of system usability.

In the third case study, Kreitzberg (2006) introduces content provision as a significant aspect of website usability. Here, a single point of entry to collaborated knowledge is seen as a necessity for intuitive and convenient usage. In the fourth and final case study, Martin et al. (2008) reflects directly on the usability of a C/LMS, from the student perspective. The findings suggest that a student should be treated as king. A student needs to feel in control, free and independent, with minimal or no assistance when using a system. Learners need unlimited and easy access to a fulfilling learning process (see Table 4), a need whose realisation remains utopian until appreciated, accepted and engaged by educators (Mlitwa, 2005).

The four case studies suggest that using an electronic instrument in teaching and learning requires just as much thought about the systems, as it does about the learner, content and the learning process itself. Careful thought must be given to the desired end goal, which is the facilitation of different styles of learning. This in turn requires the choice of an appropriate tool which needs to be embedded with programs and functionalities that are easy and efficient to use. In this respect, the

significance of feature relevance, minimalist design (practical simplicity), convenience and usability of a C/LMS is emphasised.

In closing, the system should be aesthetic (with minimalist and intuitive design) and consistent, with adequate help options in rare cases of need.

2.6 Summary of Chapter Two

This Chapter presents the background and literature foundations to this study. On the positive side, leading scholars agree on the central purpose for which a C/LMS should be used in academia. The consensus appears to be that a C/LMS should first and foremost "facilitate learning" (Laurillard, 2008; Martin et al., 2008; Laurillard & Masterman, 2009) and that it should "improve learner experiences" (Czerniewicz et al., 2007). For this reason, a C/LMS is seen as an important tool to support teaching and learning, which explains an increasing adoption of C/LMSs by universities globally since the year 2000.

The opening section presented the problem of divergence in interpretations of e-Learning concepts among the academic community. Disagreements are rife on the practical methods of using a C/LMS to facilitate learning. At the pedagogical front are claims that C/LMSs offer an educational value only when used within the constructivist paradigm. Within this school of thought, constructivists are not only questioning the value of behaviourist learning, but dismiss any linkage of a C/LMS with direct knowledge transmission methods as "utterly ludicrous" (Mlitwa & Nonyane, 2008). Behaviourist uses of a C/LMS, therefore, are not only frowned upon, but ridiculed and discouraged. Further, the dismissal of e-Learning in education, with pessimistic lecturers describing a computer as nothing more than a tool to manipulate learners, is also noted in this chapter.

2.6.1 Interrogating the Status-Quo

The problem with a lack of clarity on the practical aspects of implementing a C/LMS is that usage patterns by academics remain incoherent and impotent. Concerns over a lack of impact on current C/LMS use in academia are raised in Europe, Canada, the USA and South Africa among other countries. The problem according to

Laurillard (2008) is that educators forget to focus on the critical aspect of e-Learning, which is learning. Therefore, lecturers are advised to always start by understanding clearly “what it means to learn”. Then they should use that insight to define solutions they need, and articulate appropriate use of a C/LMS. The main point is that “no two learners are alike”. Hence differences in “learning strengths and styles” should always be catered for. The behaviourist, the cognitive and the constructivist pedagogical paradigms are offered to support this point. The blending of different pedagogical aspects in computer assisted instructional design is then suggested.

2.6.2 Inter and Intra-pedagogical Approach to e-Learning

It is shown in Table 4 that a C/LMS should enable open and flexible access to learning materials, it should facilitate the storage and exchange of different formats of data, easily, speedily, safely and reliably across time and space. For a C/LMS to meet these criteria, system usability becomes crucial. Hence relevance to user needs, the minimalist design (practical simplicity), efficiency and ease of use are emphasised in Table 6 . The closing argument is that whilst learning styles differ, each learning strength and style works in synergy with (and not in isolation from) other styles within an individual. Behaviourist learning strengths for example, would enhance (and be enhanced by) non-behaviourist styles of learning. From this point, an argument for platforms that are interoperable between various pedagogical paradigms in a C/LMS is put forward in this thesis.

2.6.3 Conclusion of the Literature Foundations

Educators are in agreement that a C/LMS adds value to teaching and learning, but are divided on what matters most, the practical aspects of how to facilitate learning over a CLMS. As such, current uses of a C/LMS in universities remain incoherent and speculative, with growing concerns over a lack of impact on the quality of learning in South Africa and beyond. With this background, shifting the focus of this thesis from the discourse of locating technology onto pedagogical paradigms, to explanations of C/LMS usage limitations in academic environments in South African universities, becomes logical. An appropriate research approach (and analytical frameworks) for this thesis are outlined in chapter 3.

CHAPTER THREE: RESEARCH APPROACH

"…theories… are the products of the particular conditions in which they are created. If they are to be useful in other times and places therefore, they must be treated not as repositories of truth that are fixed and immutable, but **as helpful tools for thinking with**, which can themselves be improved in the process" (Wells, 1999: 334)

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3. INTRODUCTION

This chapter explores a research approach that is more appropriate for the context of this thesis.

A research approach refers to the philosophical convictions and the theoretical assumptions adopted to conduct research (Mlitwa & Van Belle, 2010). A clear approach draws on relevant research paradigms to point the direction, offering logical lenses through which knowledge can be viewed and analysed (Tedre, 2006). Best described as a "disciplinary matrix" (Kuhn, 1962), a paradigm is a means to reflect and share the core assumptions and values about a discipline (Burke, 2007). A paradigm represents the ontology and epistemology-based world views on the nature of existence (reality), knowledge and the ways of getting to know (Hevner et al., 2004). It is used, to a greater extent, in shaping ideas and actions in research (McArthur, 1992).

A typical research approach, thus, incorporates a paradigm, the conceptual and theoretical frameworks, as well as relevant methods and techniques to design research, to collect, analyse and to interpret data (Kuhn, 1996).

In terms of the structure, this chapter opens with a discussion of relevant epistemological paradigms, and the outline of the most appropriate paradigm for this thesis. The interpretive research approach is motivated for and applied in section 3.2.

Finally, relevant theories are discussed, and the activity theory is adopted as a basis for the operational framework of the thesis in this chapter.

The outline of the chapter is presented in Figure 7

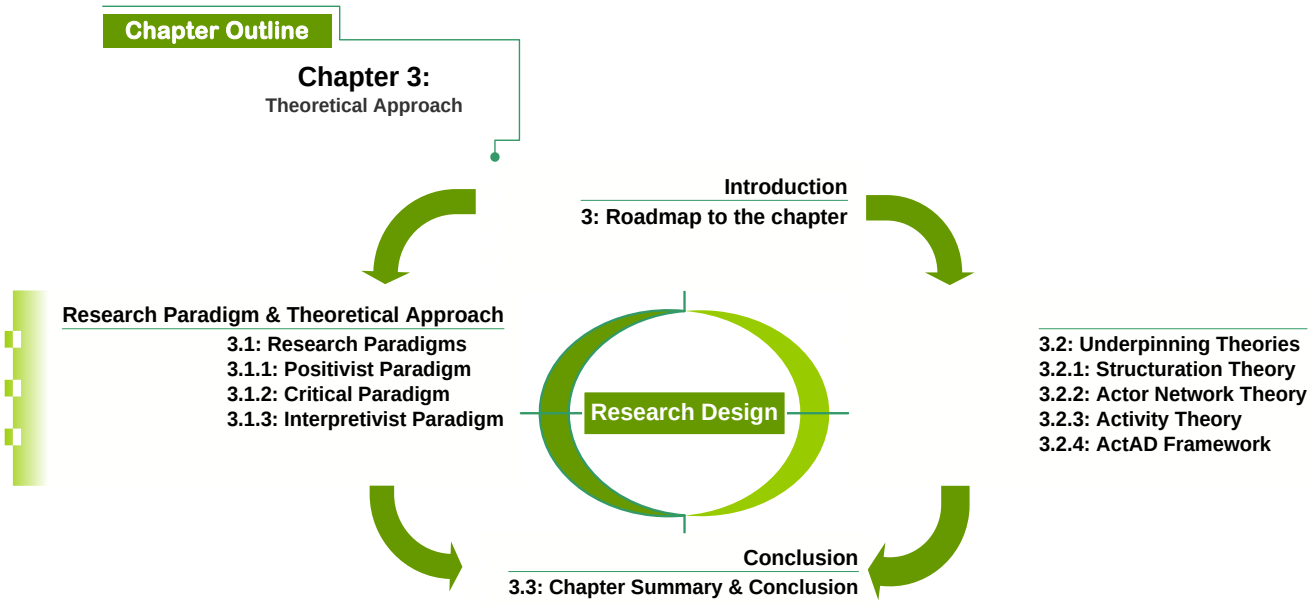

Figure 7: Outline of Chapter 3

3.1 IS Research Paradigms

As a fairly new discipline, Information Systems (IS) is yet to evolve into a theory-exporting field. With its roots in computer science, management studies and humanities, it remains a multi-disciplinary and theory-importing field (Rose et al., 2004). Information systems discipline, therefore, builds on the positivist, the interpretive and perhaps the critical paradigms for its research (Baskerville & Myers, 2002).

The choice of a paradigm is a highly contested subject in IS research, with decisions largely dependent on the researcher's alignment with ontological and epistemological assumptions in and across the paradigms. The position of this thesis is that two of the three IS research paradigms, positivism and intepretivism, agree on ontological assumptions, but differ epistemologically (Becker & Niehaves, 2006). The very goal of trying to learn how IS as a socio-technical practice and a research discipline works (and how it can be improved) in positivist and interpretive accounts,

presupposes the existence of reality outside the human realm (ontological realism) (Weber, 2004). Where the paradigms differ is on the assumptions on the nature (whether it is subjective or objective) and on how to learn about the real world (ibid.). However, this disagreement is not so significant as to lead to a contradiction in theories between the paradigms (Niehaves & Stahl, 2006). The ontological tone in the preceding chapters of this thesis, therefore, is not paradigm specific, but reflects the ontological-realist presuppositions which, as argued in this section, are shared by the two paradigms.

3.1.1 The Positivist Paradigm

Positivism is a research paradigm which assumes the existence of the objective reality (ontological realism). The subjective reality and the subjective techniques of enquiry about the truths are dismissed (Burke, 2007).

Positivism is premised on the supposed *"existence of a priori fixed relationships within phenomena*…"(Orlikowski & Baroudi, 1991: 5). As such, it is largely aligned with experimental and quasi-experimental design, using the rules of formal logic and the rules of "*deductive logic*" (Howcroft & Trauth, 2005). The facts are assumed to be objective, empirically measurable and that the subject should be separated from the object and context (Burke, 2007). Research under this paradigm often follows hypothesis formulation and the testing of theories, with the focus on enabling predictions and generalisations about a phenomenon (Myers, 1997). The positivist research tradition (1) prioritises natural science research methods with regard to any other method, and (2) assumes that natural science phenomena (matter and machines), social science (humans) phenomena and related investigations are sufficiently similar. The implication is that (3) the logic of fixed relationships between phenomena applies to all researchable disciplines, hence natural science research methods should be applied to all research (Babbie & Mouton, 2001).

On the basis of the assumption that "*the best or only way of measuring the properties of a phenomenon is through quantitative methods*" (Babbie & Mouton, 2001: 49), this approach tends to privilege one perspective of inquiry into varying disciplines. Understanding the theoretical and practical dynamics of technology in

social (educational) settings will surely require more than just the deductive methods of theory testing. An understanding of the context-based and subjective insight about the socio-technical contexts of technology adoptions in educational settings is significant. Whilst the positivist approach may be useful in the outline of first order (factual) problems about the number of computers and the frequency of use by students and staff, it is not geared for the interpretation of context specific factors such as feelings, beliefs and motivations. It cannot be used to uncover and explain contextual relationships between technology and the social phenomena outside a preconceived theoretical framework (Klein & Meyers, 1999).

Certainly the conceptual framing of ICT issues requires both the factual insight into the status quo, and subjective interpretations of the social, technical and environmental (organisational) contexts by stakeholders. The subjective contextual factors cannot be fully understood by using only the predictive hypothesis-testing measures of variables (ibid.).

3.1.2 The Critical Research Paradigm

The critical research paradigm is not necessarily an exclusive alternative, but a different or perhaps additional level of analysis that can be applied to positivism or interpretivism to get a critical-positivist or a critical interpretive paradigm (Niehaves & Stahl, 2006). The critical perspective "*considers organisations and information systems* [or information technology in this case] *in wider social contexts, attending to issues such as power, domination, conflict, and contradiction*" (Howcroft & Trauth, 2005). Critical research assumes the social realities to be unjust (Klein & Huynh, 2004). It then critiques repressive conditions that restrict from developing to their full potential, by pushing for a change to the restrictive and alienating status quo (Alvesson & Wilmott, 1992) and, ultimately, to promote emancipation of alienated individuals (McGrath, 2005). Because of this focus, the critical paradigm has predominantly been applied to question the alienating and dominating power relations in socio-technical contexts (Niehaves & Stahl, 2006).

On the basis of its central thesis, which is the critical intention to emancipate the seemingly alienated individuals, the critical paradigm is more appropriate for studies

where alienation is evident, and the goal is to emancipate the alienated (ibid.). Evidence of alienation is rather more tentative than prevalent in the research problem of this thesis. Whilst the critique of the status quo on the factors of adoption and use of a C/LMS is necessary, exclusive use of the critical research paradigm would be short-sighted to the objective of the current study. Instead, the critical interpretive perspective is adopted.

3.1.3 The Interpretive Paradigm

Interpretive research paradigm attends to the intangible contextual factors such as the subjective feelings, attitudes and relationships in IS research (Burke, 2007). It focuses on the complexity of how humans make sense of situations as they emerge (Kaplan & Maxwell, 1994), with emphasis on interpreting phenomena exactly as people see them (Orlikowski & Baroudi 1991; Deetz 1996). Whilst ontological realist assumptions are held, it rejects the positivist epistemological claims that objective knowledge is achievable. Instead, knowledge is assumed to be always subjective to the context and researcher interpretations (Niehaves & Stahl, 2006). IS research, according to Kaplan and Maxwell (1994), is interpretive if it is based on the assumption that "*our knowledge of reality is gained only through social constructions such as language, consciousness, shared meanings, documents, tools, and other artefacts*." That is, the meaning (sense-making) of the independent reality is socially constructed (ibid.). The thinking behind this study is that technology is a social construct. It is an *"embedded system"* (Orlikowski & Iacono, 2001: 126) that represents both its technical form and process to which it is applied. Insight into the interplay between the social, technical factors of the adoption and use of C/LMS at universities, as interpreted by the researcher from the subjective contexts of the lecturers and learners, therefore, is central to this investigation.

Because of the focus "*at producing an understanding of the context of the information system, and the context whereby the information system influences and is influenced by the context*" (Walsham, 1993: 4-5), the interpretive paradigm is ideal for this thesis. Seven principles of interpretive research clarify the appropriateness of this approach in analysing ICT processes and social interactions in higher education

(Klein & Myers, 1999: 72):

- the hermeneutic circle
- contextualisation
- interaction between researchers and the subjects
- abstraction and generalisation
- dialogical reasoning
- multiple interpretations, and
- the principle of suspicion.

3.1.3.1 The Hermeneutic Circle Principle

Hermeneutics is about interpretations and making sense of meanings (Lee, 2004). Viewing research as a hermeneutic process enables the scientist to focus on how far to enter into the research process itself, to improve the understanding without compromising the validity of the enquiry (ibid.).

Since phenomena are subject to various interpretations, this principle places high emphasis on iterations between interdependent meanings of various parts of a phenomenon in relation to the whole that they form. The principle of the hermeneutic circle applies the iterative sense-making process between the terms and their meanings within a context to interpret phenomena. This principle was successfully applied by Lee (1994) in his investigation of the richness of the electronic mail (e-mail) medium in enabling effective communication by comparison with face-to-face communication. By tying together the meanings of various parts of the message and linking them to the context of the whole message, maximum understanding (clarity) of the message was achieved.

The richness of data in the current study is located in subjective experiences and encounters by lecturers and students, with the social and technical factors of C/LMS adoption. In the same way as Lee (1994) did, the operational framework is used as a context to interpret meanings of different experiences in the findings. Used in conjunction with the principle of contextualisation, therefore, the principle of hermeneutic circle enriches the understanding of the interplay between the factors of adoption, usage and non-usage of e-Learning tools in this study.

3.1.3.2 The Principle of Contextualisation

We are a product of our environment, social context and history (Leont'ev, 1978; Vygotsky, 1978). To help researchers understand and account for the situation under investigation, the contextualisation principle pushes for a research subject to be viewed within its historical, social and cultural contexts (Klein & Myers, 1999). Analysing lecturers' perceptions on the enablers of computer assisted learning – from their social and historical context, for example – enriches the understanding of the causal factors of limited usage of a C/LMS in the findings section of this study.

An investigation into the perceived usefulness of a C/LMS by the educator, for example, may need to begin with an understanding of the educator's background. This includes his/her encounter with the system during his/her student days. For example, since knowledge is socially and contextually constructed, prior experience with a C/LMS is mostly to inform current attitudes and usage of a C/LMS. Further, held pedagogical assumptions during the teaching career, in institutional and social environments and ultimately in the understanding of the current preferences and patterns of usage, contextualises explanations with regard to the status quo. The principle of contextualisation is carefully embedded in the data collection tool, on the structure of the questions, the gathering of information from the participants and, ultimately, the use of the operational framework to interpret data afterwards. A research instrument in Table 7 (Chapter Four) for example, is structured into three contextual themes – the social, the technical, and the institutional factors that jointly describe the context of e-Learning adoption in the study.

3.1.3.3 Principle of Interaction between Researchers and Subject/s

This principle suggests that insight in research emerges from the interactive process between the researcher and research subjects (Klein & Myers, 1999). Clearly, if the frames of reference are confusingly divergent, the researcher and respondents are less likely to understand each other. As such, the significance of data collection considerations are emphasised in this principle. A researcher is advised to place himself/herself in a realistic historical context that will enable a meaningful interaction with respondents when preparing for data collection (ibid.).

This principle was considered useful in strengthening the depth of the research tool (interview questionnaire) prior to the collection of data in this thesis. As shown in Table 7 and under interview transcripts in Appendices 2 and 3, the terms were clearly defined according to the theoretical framework to minimise unnecessary confusion during research interviews.

3.1.3.4 The Principle of Abstraction and Generalisation

Although interpretive research does not seek to test and prove this hypothesis, theory still plays a significant role in this paradigm of enquiry. Using a theory in a sensitising manner rather than to falsify other theories is necessary to distinguish between research interpretations and anecdotal research (Klein & Myers, 1999). The principle of abstraction emphasises the use of appropriate theoretical lenses to understand the situation under investigation so as to enable some level of generalisation that helps in the development of concepts as well as in the drawing of inferences from rich insights (Walsham, 1995a). A number of theories exist in information systems to assist researchers in developing frameworks upon which contextual abstractions and generalisations could be based. Theories that are commensurate with the interpretive paradigm, i.e. the Actor Network Theory (ANT), the Structuration Theory (ST) and Activity Theory (AT), among others, are discussed under section 3.3.

3.1.3.5 The Principle of Dialogical Reasoning

The principle of dialogical reasoning emphasises the need to apply objective rather than biased reasoning in an investigation. In this respect, the researcher/s ensure that they do not allow personal prejudgements and bias to divert the actual meanings of phenomena in an investigation (Klein & Myers, 1999). A researcher is advised to clearly identify a specific philosophical and theoretical stance to interpret the meanings, so that interpretations will remain consistent, unbiased and reliable. It is this line of reasoning, therefore, that interview discussions were conducted with the participants in this investigation. As participants hold different perceptions, interpretations and motivations to e-Learning terms and practices, alertness in this respect enabled probing of responses that seemed to have multiple interpretations.

3.1.3.6 The Principle of Multiple Interpretations

In accepting the significance of historical, social and cultural contexts in shaping our perspectives of knowledge, interpretive research anticipates that people may attach various, and sometimes contrasting, meanings to similar concepts, terms or situations. Whilst e-Learning in the constructivist sense may imply the use of interactive networked platforms to facilitate learning, for example, behaviourist educators may be content with a mere capacity of the technology to deposit and retrieve content (Czerniewicz et al., 2007). The point here is that e-Learning and the use of C/LMS in teaching and learning would carry different pedagogical assumptions and meanings to different lecturers.

The principle of multiple interpretations requires a researcher to account for multiple viewpoints in an inquiry, and to seek clarity on their motivations (Klein & Myers, 1999).

The principles of multiple interpretations and of contextualisation are more closely related in an e-Learning environment. Clearly, because the historical, social and cultural contexts need to be investigated in order to understand a respondent's motivation for a specific point of view. In applying the principle of abstraction and generalisation together with this principle, one should further reconcile variations in meanings – warily guarding against possible "*false preconceptions*" (Klein & Myers, 1999: 77). It is in this context that the principle of multiple interpretations was used in the framework of this thesis.

3.1.3.7 The Principle of Suspicion

In view of the possibility of false preconceptions, false consciousness, the existence of socially created distortions and psychopathological delusions, it may not be enough to only interpret the meaning uncritically (Klein & Myers, 1999). For this purpose, the interpretive researchers have adapted Ricoeur's (1976) principle of suspicion into their research tradition. In this principle, Ricoeur argues for the exposure of distortions and delusional arguments in interpretive research. The principle of suspicion is influenced by critical theorists such as Harbermas and Foucault (Ngwenyama, 1991) as well as Myers and Young (1997), among other

writers. From this perspective, findings are not taken at face value, but are critiqued against established theoretical assumptions presented in Chapter Two, and against peer perspectives on similar points raised by interviewees. The critical aspect embedded in this principle helps to improve the depth of analysis in that phenomena are viewed not just at their face value, but with extended critique of tensions that emerge from the findings in this thesis.

3.1.4 Conclusion on Research Paradigms

In this section it was argued that a theoretical lens to IS research is necessary to separate the scientific activity from the speculative anecdotes. Reflecting on the development history of IS research, reference to how IS research has been dominated by positivist thought is also made. Positivism is "*premised on the existence of a priori fixed relationships within phenomena* (Orlikowski & Baroudi, 1991: 5). It tends to support the hypothesis and theory-testing formats of investigations that are largely aligned with natural sciences. In the name of "objectivity", a subject of investigation is viewed independently of the context under this epistemological tradition. However, this study investigates subjective issues of the socio-technical context. By implication, a paradigm that would enable interpretations of social and cultural contexts would be more appropriate for this thesis.

Since the interpretive tradition of research is *"aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context"* (Walsham, 1993), it fits the purpose of observation in this thesis. The adoption of the interpretive paradigm implies a selection of interpretive methods of carrying out research.

Within the selected interpretive paradigm, case studies, interview and document observation techniques as well as the appropriate interpretive analytical techniques are discussed in Chapter Four.

A possible theoretical foundation for this thesis is explored in section 3.2.

3.2 Analytical Frameworks

The principles of abstraction and generalisation emphasise the use of a theories as analytical lenses (frameworks) through which an investigation and its analysis can be based. Using theories either as analytical devices or as objects of validation and development has been common practice in IS research (Kaplan, et al., 2004), with over 154 theories noted in various IS journal publications in 2009 (Lim, et al., 2009).

The dominance of certain theories in respective paradigms within IS research is also reported. Within the interpretive stream, the Actor Network Theory (ANT) is ranked as the top most commonly used theory in 381 socio-technical research papers published by the IFIP WG8.2 over its 17 conferences (Flynn & Gregory; 2004). The ANT is closely followed closely by the Structuration Theory (ST) and the Activity Theory (AT) in the top ten most preferred theories in IFIP WG8.2 IS Publications.

Starting with ST in 3.2.1, the three most popularly used theories in IS research are investigated for appropriateness to this study, in this section.

3.2.1 The Structuration Theory (ST)

As a young discipline, IS continues to draw its research theories from the older disciplines such as sociology, anthropology, psychology, management disciplines and computer science, among others (Johnston, 2001). The growing popularity of sociology theories, such as the ST in information systems (IS), is an example (Jones & Karsten, 2008).

ST is a general theory of social organisation. It is also an ontology of what exists rather than what happens in society in that it is used to understand "*what sort of things are out there in the world,* [rather than] *what is happening to or between them*" (Craib, 1992: 108). In its assumptions that "*we create society at the same time as we are created by it"* (Giddens, 1984: 14), ST rejects the thesis that sees social phenomena as informed solely by (or products of) the social structure or agency separately. Instead, the focus of ST is on social practices that jointly constitute individual and societal activities, hence structure is said to be activity-dependent. That which Giddens calls the "double hermeneutic" principle or the joint involvement

of society and individuals, further informs the production and reproduction of practices across time and space. The principle of structure and agency – where social structures and autonomous social agents are mutually constitutive (Giddens, 1990; 1991) – assumes that the structure consists of norms (rules) and powers of signification, domination and legitimation. This is where social agents make sense of rules and practices through continuous interactions. In this instance, compliance with the expected behaviour is not voluntary, but is legitimised and motivated while unacceptable behaviour is sanctioned.

On this basis, policies as reinforced through socially reinforced (sometimes referred to as cohesive) practices define the social order. In the case of C/LMS usage, institutional policies and e-Learning strategies would serve as the determining factors of practice. Adoption and use of a C/LMS would be determined mainly by the general acceptance of, and loyalty to, these rules. On the other hand, peer pressure would be adequate to enforce compliance, or to sanction deviation from the rule (non-usage).

Whilst the ST would have offered an appropriate analytical lens to this investigation, the actor network theory (ANT) and the activity theory (AT) frameworks are more preferred, mainly due to the researcher's extended experience and confidence with use of the two theories.

3.2.2 The Actor Network Theory (ANT)

ANT is a socio-technical approach to understanding, explaining and structuring the links between technology and persons or society (McBride, 2000). Moving from the assumption that technology is socially constructed, ANT offers explanations on how technology is accepted by, and is integrated into, societies. It focuses on the stakeholders who are both human and non-human actors working towards achieving particular interests (Latour, 1992). ANT places a semiotic emphasis on the human and the technical agents (Latour, 1987 & 1992; Callon, 1991) with arguments that technology should always be viewed with reference to the social aspect (Hanseth & Monteiro, 1998). ANT presents a network as a sum of inter-related and causal connectedness of all factors on any socio-technical account. It pushes for the

elimination of all a priori distinctions between the technical and the social actants (Callon, 1986) in what Law and Hassard (1999) refers to as a heterogeneous network.

The significance of a network is in its “continually negotiated processes”, where both human and non-human (artifact) actors have a mutual and causal influence in network processes (Tuomi, 2001). While a social network is merely a set of people, organisations and perhaps their structures that are connected by a set of social relationships, a socio-technical network includes technologies that people construct and use in collaboration (Lamb & Davidson, 2002) where each act matters in the outputs of network interactions. There is no network without actors (Latour, 1992). Each actor can be viewed in relation to, and not separately from, other actors or parts of the network, and actors cannot act outside of a network (ibid.). Hence ANT presupposes a continuous enrolment of actors into the network by a negotiated alignment of heterogeneous interests with the interest/s of the network (McBride, 2000). A continuous translation of interests, to the extent of establishing stable inscriptions that, when achieved, gives heterogeneous actors a specific viewpoint or a network viewpoint.

The ANT is built on the argument that knowledge is embedded in social processes, conceptual systems and material artefacts that are used in social practices (Callon, 1991; Latour, 1992). Looking at e-Learning from the ANT perspective, therefore, requires a negotiating interplay between the human and non-human actors in the e-Learning environment. Through the ANT lens, then, one may not view technology as just a neutral passive thing, but as an actor within the human-technology network.

In this thesis a C/LMS is viewed as a socio-technical network that incorporates a computer, network, applications, learning material, learners, educators and/or mediators. Just as human and non-human actors assume identities according to prevailing strategies of interaction in the ANT (Hanseth and Monteiro, 1998), the parties within the e-Learning network should not only be mutually engaging, but keep interpreting and aligning everyone’s interests with some “network interests”. Independent goals are automatically discounted, even more strongly when they

differ from the network dogma. This view, however, is not commensurate with the practical structure of independent instruction. Whilst engagement with other stakeholders in a teaching and learning environment is an option, the principles of inscription, translation, alignment of interests, and that actors can only act within (and not outside) a network, seems to contradict a lecturer's prerogative to go along with some, none, or perhaps with all actors, without diverting from the educational purpose. Academics, for example, hardly depend on a continuous negotiation of their pedagogical preferences with their colleagues to use or not to use a C/LMS in their teaching.

Since parties (actors) within a network are supposed to be mutually engaging and interdependent to the extent that actors do not act or exist outside of a network, the ANT would appear to be overly prescriptive. The ANT seems to further support the instrumentalist view of technology – where the tool is seen as value-laden and therefore capable of exerting a certain level of influence on the network of actors (Feenberg, 1996). Some level (but not a symmetrical level) of influence between the technical and social actors is accepted in this thesis, though tools are seen as incapable of engaging in cognitive decision processes, and are understood to have a significant but lesser level of influence in the socio-technical network. For example, humans may choose to ignore technical artefacts if they have negative perceptions of their usefulness, or find them to be complex or user-unfriendly.

This thesis shares the mutual shaping view of actors in a network, and the view of a teaching/learning structure as a network. Whilst accepting the multi-actor view of e-Learning environments, there are reservations about the symmetrical notion of humans and non-human actors. The said reservations however, did not in any way disqualify ANT as a theoretical framework for this study. Whilst ANT, ST and the Activity Theory would offer equally insightful theoretical frameworks for this study, the Activity Theory is practically, the most preferred. Motivations are offered in in section 3.2.3

3.2.3 The Activity Theory (AT)

Activity theory (AT) is a meta-theory that views social activity as a purpose-driven,

activity-based and a context-situated phenomenon (Leont'ev, 1978). As an analytical framework, AT assumes that IS projects (such as e-Learning adoptions) are collective work activities (Engeström, 1987). Work activity refers to a view of social activity as a widely accepted, rules-based, deliberate and collective work by various people (subjects), in pursuit of a common purpose (object) (ibid.). Subjects use tools (artefacts or instruments) to carry out actions towards achieving a goal (outcome) (Korpela et al., 2004). Because work activity is a collection of activities by different actors, and that the pursued purpose (object) is shared by others (community), work activity is described as complex, highly mutable, situation-dependent, subject to value conflicts, and therefore complex (Bødker et al., 2004). For this reason, the use of work-oriented and theoretically sound methods in information systems research is emphasised (Korpela et al., 2004).

In this endeavour, AT builds on Engeström's (1987) Developmental Work Research (DWR) model to propose a theoretically sound, work-oriented and activity-based analytical approach. On the premise that the work activity involves actors, tools and objects, Kuuti (1991) suggests that the inclusive "activity system" (and not just the information system) should become the object of analysis in IS research. The basis of a recommended activity system is to view work activity as a systemic entity (Korpela et al., 2004). A systemic approach refers to a holistic analysis of a phenomenon, in terms of the linkages between the purpose (object), the stakeholders (subject), the process (transformation), the mediating factors (tools, rules, community issues, the division of labour) and the outcome (Engeström et al., 1990; Mursu et al., 2007).

In this respect, technology such as a C/LMS must be seen as a tool to facilitate work in the activity system. Further, that both the collective (group or entity) and individual aspects of work must be fully accounted for, and that work systems must always be studied in their organisational contexts. The activity system framework should also enable descriptive accounts, make sense to practical developments and make operational sense to workers.

3.2.3.1 Relevance of the AT Concepts

Within the activity system, the “object” refers to the purpose for which a social activity is being carried out (Engeström, 1987). In the case of e-Learning, facilitating different styles of learning would be the main purpose of C/LMS usage. Similarly, the “subject” which refers to stakeholders would include teachers (lecturers), system administrators, e-Learning coordinators, network administrators and students (as per ActAD Framework in Figure 9). The concept of stakeholders, however, should not be limited to individuals, but also to groups and entities (Korpela et al., 2004). So stakeholders (actors) in the e-Learning context would also include institutions, departments and related bodies.

Obviously, the stakeholders (actors) use tools, policies and procedures (rules) to carry out their respective activities. The tools in the context of e-Learning would include computers, systems, specific educational software, curricula and learning materials (as per Figure 9). The actual process of spelling out tasks, assigning responsibilities and the translating of rules and goals into various activities is described as the “transformation”, in that when all the enabling factors are conducive, activities are successfully carried, leading the realisation of a desired “outcome”. In the context of e-Learning, the process would represent the actual use of the “tools” outlined in Figure 4, under the guidance of the institutional mission, e-Learning policies and strategies as well as pedagogy, to design and deliver Web-based learning. Success in this respect is dependent on mediating factors (mediators) such as the “rules” (pedagogy, curricula, policies, strategies and procedures), the tools as well as the social and technical contexts and, most significantly, the tensions between mediators.

3.2.3.2 Relevance of AT in Human-Computer Interaction Studies

The appropriateness of AT as an analytical framework for socio-technical interactions is strengthened by its cross-disciplinary stance on work activities. It offers a holistic approach to analysing both the individual and the collective, as well as the context – at the same time (Mursu et al., 2007). It provides the conceptual and practical lenses to viewing inter-relationships between activities, operations,

tools, actor motives, as well as the intervening factors of the social, organisational and societal contexts within which the work activities are framed (Kuuti, 1995). In this respect AT has been applied in studies of equivalent context to this thesis, with resounding success, since 1991.

The work activity version of the AT is being applied in an increasing scale in Information Systems, Information Science and in several other Human Computer Interaction studies since 1991. AT has been used by Bødker (1991) and Mwanza (2001) as a context-based framework to understand and analyse systems design from a multi-stakeholder perspective in Finland, with great success. Similarly, Bardram (2000) as well as Redmiles (2002) also found the AT system framework useful in giving a holistic understanding of computer-supported cooperative work in a surgical environment. In information systems, Bertelsen and Bødker (2000) and Vrazalic and Gould (2001) have also used the AT as a framework to contextualise the design of an information system, from a purpose-driven and multi-stakeholder perspective, and to evaluate technology usability methodologies, respectively, with resounding success.

3.2.3.2.1 AT Uses in Contexts of Equivalence to e-Learning

AT has been interpreted, redeveloped and used by a number of theorists and researchers (Sandars, 2005) to analyse material conditions of human-computer interactions from a means-ends, user-needs, activity system perspective (Miettinen, 1997 and 2002; Rajkumar, 2005). For example, Miettinen, *et al.* (2002) used the AT to articulate the needs of the user of a high technology product. Rajkumar (2005) also uses AT to describe the adoption of wireless technology for mobile learning, as a work activity system that has stakeholders (actors), activities, mediating factors and a goal towards which activities are focused.

AT has also been used in context-based investigations of individual and social transformations in information systems research by Kuutti (1991) and Korperla et al. (2002). It was also used by Kuutti and Molin-Juustilla (1998) as a research approach to investigating coordinations in networked organisations. In similar contexts, Kekwaletswe (2007) also applied AT in his doctoral study of the dynamics of mobile

technology in learning environments, with resounding success. Kekwaletswe found the theory to be a very empowering analytical tool for interpreting the phenomenon of “mobile learning”, mobile technologies, the influencing factors or mediators and the context in which mobile learning takes place. Given the similarity of Kekwaletswe’s context to that of this thesis, appropriateness of the AT framework in the current study is, logically, assumed.

3.2.4 The Activity System

Our actions derive their meaning from the context, and as such “actions without a context are meaningless” (Mursu et al., 2007: 6). In translating this logic to the current thesis, it clearly suggests that factors of C/LMS usage in teaching and learning cannot be adequately understood outside of the social, technical and institutional environment to which e-Learning practices are embedded. In this respect, AT is used to develop the work activity system framework for understanding and analysing the factors of C/LMS adoption from a context, activity-based and a multi-stakeholder (actor) perspective. The terms of the Activity Analysis and Development (ActAD) Model that are used to formulate e-Learning ActAD framework later in the chapter, are mapped out in Figure 8.

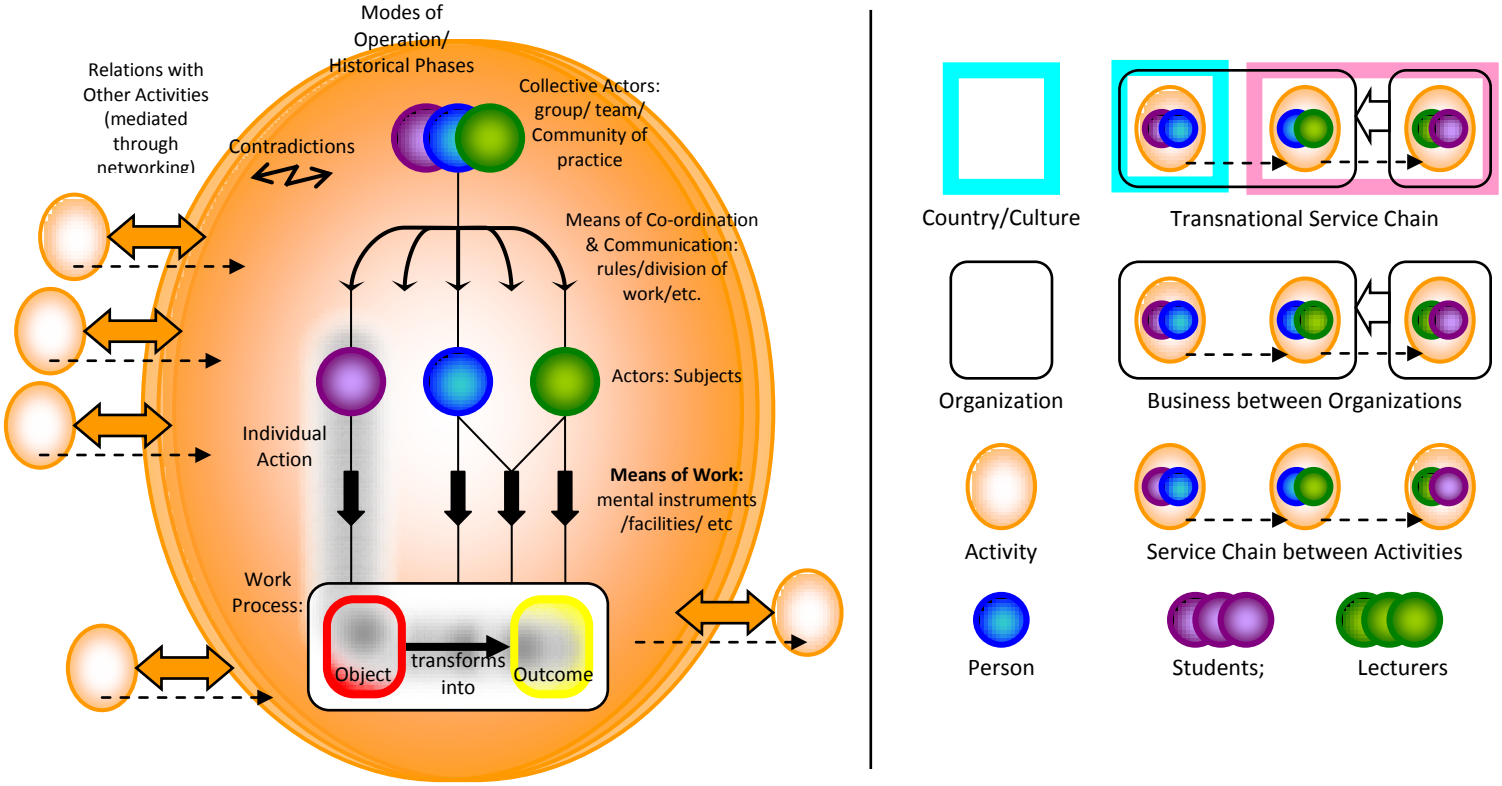

Figure 8: The ActAD Model

As the underlying theory, the AT is used to formulate a model in Figure 8, and a framework in Figure 9 to clarify the factors of, and to explain related tensions to, C/LMS adoption and use in institutions of higher learning.

The purpose of Figure 8 is to further assign meaning to the symbols that represent different aspects of the e-Learning Activity Analysis and Development (ActAD) framework that has been developed and presented later in Figure 9. In this respect, Figure 8 presents different aspects of a work activity in their respective levels of analysis from the national entity such as a country or culture (represented in a solid green square).

In the next level, a collective-actor (organisation) is represented by a thin square. This is followed by an oval image which represents the activity, and ultimately, a ball-like image which represents individual actors. Different colours are used to categorise individual actors into different roles within the activity system.

The ActAD model in Figure 8 is used as an e-Learning analytical framework in Figure 9.

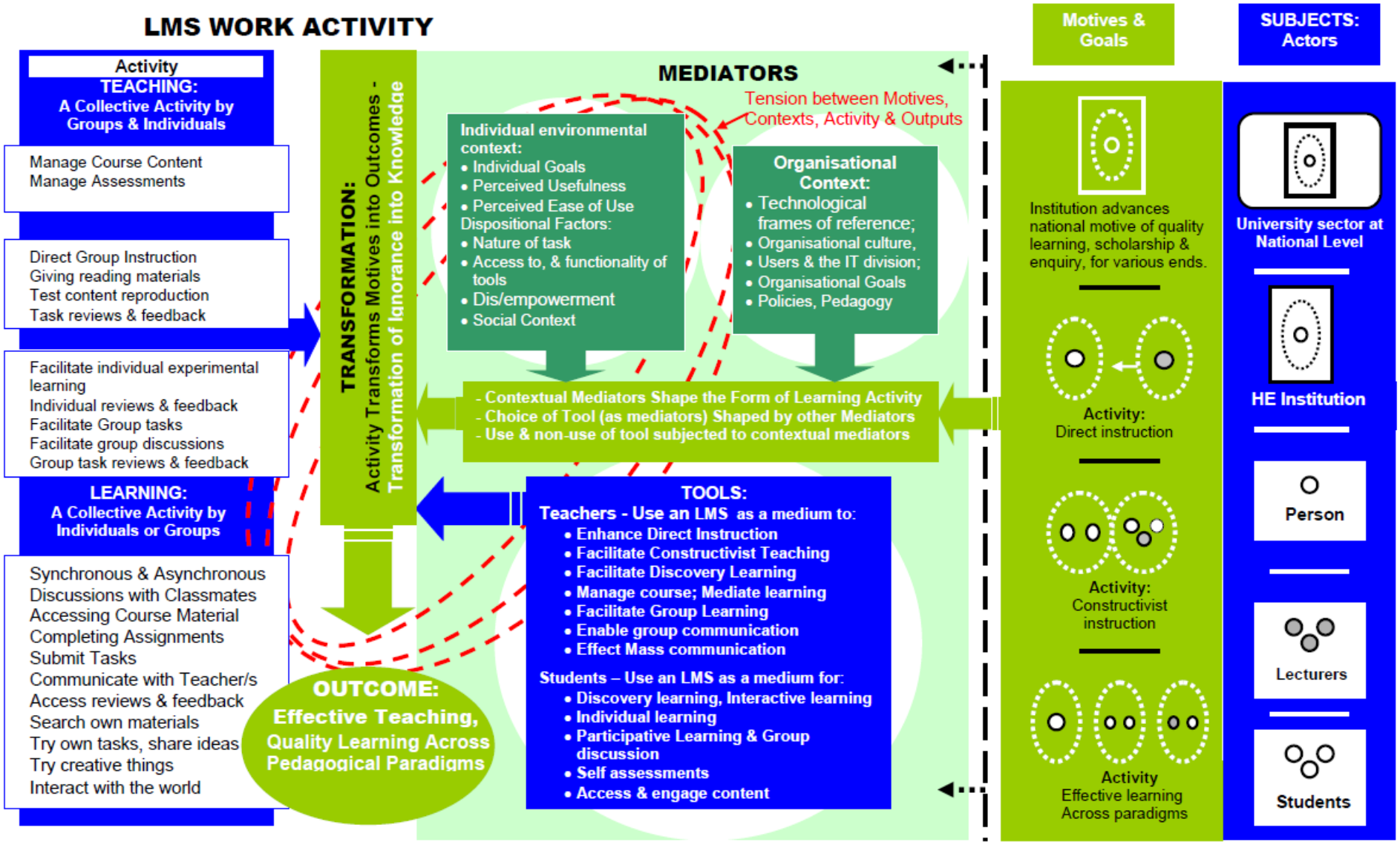

Figure 9: e-Learning ActAD Framework for University Contexts

The e-Learning ActAD Framework in Figure 9 is used as an operation tool to understand, analyse and explain goals, procedures, actions, interactions and relationships between actors, tools, artefacts and the environments of e-Learning in higher education institutions.

3.2.4.1 e-Learning ActAD Framework as an Explanatory and Analytical Tool

At the first instance, subjects (individual actors) create artefacts on a continuous basis in the activity system, to better enable the realisation of a desired outcome/s. In what Laurillard (2008) terms the "teacher as action researcher", a continuous engagement with the artefact points to a need for a lecturer to keep investigating the meanings of learning and, accordingly, adjust the uses of a C/LMS on an ongoing basis. This point is incorporated into the data collection tool, and its status is analysed in the findings.

Further, the notion of the object (purpose) suggests that e-Learning practices are not meant to unfold purposelessly, but are in pursuit of an identifiable outcome (ibid.). Whether the use of a C/LMS is linked to a specific educational purpose has an impact on whether the tool is used, and how (Laurillard, 2009). This is an important point towards understanding the factors of C/LMS usage in this thesis, in that it could (together with other factors) explain some aspects of usage (or non-usage). Though the object (purpose) is closely related to the *outcome,* they are separate phenomena (Mursu et al., 2007). The object exists before and along the activity. It has a finite time-frame that ends with the transformation of the object into an outcome, or an alteration, renewal or abortion of the object following failure to achieve a desired outcome, possibly due to contextual or mediator tensions. The desired outcome is a function of a successful interplay between the *object* and the *actions* as well as the mediation process, where the object undergoes a successful *transformation* into an outcome. The activity, therefore, is never an end in itself but a goal-oriented process towards a realisation of the outcome. Hence, a careful decision on the choice of the enabling tools is important. These three work-activity phenomena are integrated in the data collection tool, and are scrutinised within this context under the findings.

In the case of a C/LMS, perceptions on the usefulness (PU) and the ease of use (PEOU) inform the initial decision to adopt and use, or to ignore a technology tool (Davies, 1989). Depending on the synergies and *tensions* among the activity-mediating factors, C/LMS usage to achieve educational goals to facilitate different styles of learning across pedagogical paradigms may be fully or partially realised, or may not be realised at all.

3.2.4.2 Teaching and Learning through a C/LMS as an Activity Objective

The activity theory puts forward the work activity as the main unit of analysis in the activity system. Interaction between teachers (teaching), learners, tools, mediators and the actual learning processes are the main activities in the context of this thesis. The overall institutional objective is in the form of a mission, and is therefore not as specific as a goal. A goal is an elaborate and practical means (usually at the individual lecturer level) to carry out the institutional objective. So, on the basis of the principle of collective activity, the individual lecturer's goal should be in line with the main institutional objective and mission, hence the question of pedagogy, guidelines (rather than prescriptions), rules and procedures. Starting with teaching as an activity objective in the activity system, a teacher needs to believe in the usefulness of the tool as an enhancer of the work activity, and should find the tool to be conveniently usable.

As shown in Figure 5 (Chapter 2), teachers across paradigms use a C/LMS tool to plan, manage, deliver, store content and interact with an individual or group of students, and to administer assessments. Since teaching is the objective (motive and goal) to advance effective learning, the teacher has the option to choose the most useful and convenient of the available tools. It is suggested in Table 6 (in Chapter Two) that a Web-based learning tool needs to be intuitive, interactive and be easy to apply flexibly to different educational uses if it is to support learning.

In additional to the readiness of the tool, studies by Mlitwa (2005), America (2006), Czerniewicz et al. (2007) and Ncubukezi (2009) suggest that the nature of the task relative to the uses of the tool, the rules of its usage, and the social context, further

determine usage or non-usage of the system. This aspect of the e-Learning ActAD framework is integrated into the data collection tool, to investigate the purpose and value that educators and learners ascribe to C/LMS usage in teaching and learning activities.

3.2.4.3 Rules, Pedagogy, Nature of Tasks and Social Contexts as Mediators of an e-Learning Activity

It is established in Figure 4 that situational policies on the usage of IT facilities, educational paradigms and pedagogies further inform usage or non-usage of e-Learning tools in a department, faculty or in the whole academic institution.

With respect to the nature of the task, courses such as information systems (IS) can be taught almost entirely through an e-Learning system. On the other hand, fine arts or even music and ballet dancing may require more physical practice, in which case the bulk of the learning would take place manually with minimal use of a C/LMS. The social context also informs technology usage in that where colleagues within a department resist e-Learning, individual lecturers may be tempted not to favour the use of the tool. From the activity system perspective, the social context, the rules, the tools, matters of empowerment or disempowerment, as well as technical capabilities serve as mediators of the teaching and learning activity – over a C/LMS. Thus, even where educators believe in the usefulness of a C/LMS, they may still fail to use it when the institutional support system and the IT network infrastructure are inadequate. The IT network should enable efficient navigation, and should carry maximum capacity to handle different versions of data and information exchanges, around the clock. With this understanding, the notions of the mediators in the e-Learning ActAD framework are used to analyse the extent to which enabling policies, guidelines and the social environment encourages effective usage of a C/LMS in an institution.

3.2.4.4 Institution, Educators and Learners as Actors

The main issue in applying the activity system approach to analysing socio-technical activities "*is whether the work involves a collective group and an information system,*

or an individual and an information tool" (Mursu et al., 2007: 6). A collective actor would be an institution, a department or a team with a commonly-held objective whose pursuit is carried out by groups or individuals. Alignment of a collective actor with a system assumes a formalised system of inter-related and linked activities towards one common objective. In an e-Learning environment, a collective of students interacts over a discussion forum in a C/LMS platform as they work towards achieving a common learning goal. At the individual level, lecturers would use a C/LMS as a tool to advance their individual activities, often with minimal or no regard for colleagues and learners. In a collective approach, the educator acts as part of a department, an institution or a member of a specific community of practice within the system (Lave & Wenger, 1998). This collective actor draws on emergent lessons from the communities of practices, and cares about the impact of an instruction on students' learning experiences (Wenger, 2006). It matters what the policy and established practices say in his/her approach to e-Learning practices. As a collective actor, this lecturer offers one or more of the courses, with other educators offering their respective bits, towards the student's qualification. Teaching in this instance is a collective process carried out by individual teachers using preferred tools. When learning is seen as a common purpose, learners are also a significant part of this collective activity (Miettinen, 1997). Other teachers, the learning environment, the learners as well as the tools further influence the teaching and, ultimately, the learning process.

By implication, the collective activity suggests some level of conscious or sub-conscious cooperation among the actors. Teaching, for example, is an institutional collective activity carried out by individual teachers. For this reason, some level of cooperation towards a common purpose is a logical expectation. In terms of the rules and pedagogy, an element of predictability of procedures, intuitive interface layout and, ultimately, consistency in terms of tool availability, task response times and functionalities would simplify system usability for the learner. The role of an institution and departments, therefore, is an important factor of C/LMS usage. This point is incorporated in the data collection tool, to investigate whether the institution provides an enabling environment in terms of the necessary infrastructure, user-

motivation, as well as technical and literacy support to enable individual and collective e-Learning activities in this thesis.

3.2.4.5 Conflicts, Disempowerments, Technical Limitations, Mediator Tensions

Matters of resistance to change by individual lecturers, top-down (and therefore alienating) approaches to introducing e-Learning systems by management, lack of training support, incompetent and uncooperative network divisions would inhibit the collective approach to e-Learning activities. A lack of cooperation between the IT network, academic planning, faculties and departments, individual lecturers and learners may further incapacitate subjects (actors) from carrying out their respective activities and, ultimately, in achieving a common objective. A potential to inhibit usage of e-Learning systems in an institution would be a major risk (Table 6).

The presence of all these factors, on the other hand, would positively mediate effective usage of C/LMSs in teaching and learning processes.

This aspect of the e-Learning ActAD framework is integrated in the data collection tool in Table 7 (Chapter 4). It is used for facilitating the understanding of power relations within and between departments, to investigate the empowering and disempowering factors such as training and technical support, as well as issues of infrastructure, software and program availability for teachers and learners in thesis.

3.2.4.6 Work Activity as Transformation

This study was motivated by observations of limited usage patterns of C/LMSs by educators in South African universities. The notion of transformation refers to the actual work process, where policies, tools, procedures and activities converge to produce a desired outcome. In the case of e-Learning – where the purpose of C/LMS usage is to facilitate, simplify and improve learning experiences – transformation would take place when Web-enabled instruction meets different learning styles over a C/LMS platform. This notion is integrated in the data collection tool (Table 7) in a manner which clarifies the nature and purposes of C/LMS usage by educators and system-usage preferences by learners in this thesis.

3.2.4.7 Quality Learning as Activity Outcome

Quality learning is the main goal (Czerniewicz et al., 2007; Laurillard, 2009) but also an intended outcome of teaching in an e-Learning work-activity system (Mlitwa & Van Belle, 2010). The quality of learning over an online platform, however, is closely intertwined with the impact that C/LMS usage offers to the learning experience of a learner. Understanding the impact is important, but the adoption of C/LMSs in academic programs has not reached adequate maturity to reflect the desired impact in academia (WEF, 2008; White, 2008). Because of limited background, pre-matured attempts to accounting about the impacts of C/LMS uses in academic programmes have led to inconclusive, and perhaps misleading speculations that e-Learning may, most probably, be failing in academia (Bates, 2009). Falling into this trap is avoided in this thesis. Instead, focus is placed on the real problem of whether a C/LMS is being used by educators, how and for what purposes. In particular, on whether a C/LMS is used to advance the output and the quality of learning. Quality learning in this study refers to the extent to which a C/LMS supports effective learning (Eom, et al, 2006) as a function of student satisfaction and positive learning outcomes (Arbaugh, et al, 2009). Learning outcomes on the other hand – refer to the extent to which learning over a C/LMS yields both the learning satisfaction and the maximum amount of knowledge a student takes away from the course or training (Eom, et al, 2006). For e-Learning to yield effective learning, and ultimately, favourable learning outcomes therefore, instructional designers, educators and e-Learning administrators should ask whether a C/LMS can provide a set of tools to support various learning models such as collaborative learning, cognitive information processing and socio-culturalism (Leidner & Jarvernpaa, 1995), and to facilitate "effective" learning across different learning styles (Gardner, 1999). Whilst implications of this statement suggests a need for instructor flexibility to maneuver between different learning philosophies, the principle of mediators, tensions and contradictions in the ActAD framework however, draws us to the practical realities of e-Learning activities in the e-Learning activity system.

At face value for example, achieving effective learning implies minimum or absence destructive tensions between contradicting mediators (factors) in the activity system.

A realistic lesson for a level-headed e-educator, instructional designer, planner and administrator operating within the inter-pedagogical context however, is that such a state of affairs only exists in utopia. With this realization, the answer to the question – “what then”, is a mere understanding of the level of complexity in managing contrasting (and the ever-changing) factors of system implementation in a higher education context. To forge success in information systems environments including e-Learning systems, DeLone and McLean (1992) recommend a constant management of, and a coordinated attention to, the quality of the system, the quality of information, the actual usage, to issues of user satisfaction, as well as the individual and organizational impact. Once again, contradictions and tensions between the factors underline the significance of constant engagement and management of the factors (or mediators) of e-Learning implementations.

3.3 Conclusion of the Research Approach (Chapter 3)

Information systems (IS) are introduced as both the field of practice and a research discipline in this chapter. As a discipline, IS draws on the positivist, the critical and the interpretive epistemological paradigms as a philosophical basis to its research thought.

Based on the underlying assumptions (and key principles) of the interpretive research paradigm, which allow contextual explanations to socio-technical interactions in e-Learning contexts, the interpretive paradigm was considered more appropriate, and was therefore adopted and used in this thesis.

3.3.1 Applying the ActAD Logic within the Principles of Interpretivism

Within the interpretive research tradition, the principle of hermeneutic circle, for example, emphasises the interpretation of meanings in a research environment. The richness of data in the current investigation is located in contextual factors that can only be accessed via subjective accounts by relevant stakeholders (actors). So, this principle is adopted and applied to seek clarifications as participants respond. The theoretical background is also used to critique certain meanings under the analysis.

The second principle, the principle of contextualisation, emphasises the significance of a research context in making sense of phenomena that are directly relevant to the context of the research. In this respect, not only the system and usages patterns are explored, but also the tools, rules, social and technical factors and the general environment are included in the investigation of the factors of C/LMS adoption and are used in this thesis. This is more evident in the third principle, that of interaction between researchers and subjects, since the subjects seldom just volunteer information, but researchers have to trigger data from the subjects. In this respect emphasis is placed on avoiding ambiguity by ensuring the clarity of questions and by using follow-up questions where meaning is concealed during the data collection phase.

The fourth principle warns of the dangers of extreme relativist tendencies, advising that things can be relative only to a specific context. As such, researchers are advised to consider the applicability of their research in similar contexts – to enable some level of generalise-ability of their findings. This paradigm has alerted the researcher to the fact that e-Learning as an IS field does exist in isolation, but is also a collective work activity, and a community of practice. From this understanding, the work of practitioners and authors in the field is recognised and used as background and points of reference in this study. The last three principles, the principle of dialogue reasoning, multiple interpretations, and the principle of suspicion, emphasise the need for critical reasoning in conducting interpretive research. In this respect, the tone of reasoning throughout this thesis is an inquisitive one – in that hidden meanings on activities, perceptions, specific conditions and patterns are vehemently critiqued and exposed.

Following the identification of the interpretive paradigm as a research approach for this thesis, theories such the structuration theory, the critical theory, the actor network theory, and ultimately the activity theory – that could be applied in interpretive frameworks – were explored. The activity theory views IS research as an activity system where collective work activities are carried out by individual and group actors, in pursuit of a common objective. In other words, teaching and learning is not an individual isolated exercise but a collective activity that is carried out either

by individuals or groups. The activity system, therefore, acknowledges the context, rules, tools and the environment as activity mediators. Success in the adoption and use of a C/LMS in facilitating different styles of learning, therefore, is context – and mediator-dependant. This assumption (from the e-Learning ActAD framework) has contributed to the inclusion of various factors that define the e-Learning in the list of possible mediators (Figure 9).

It is in this context that the activity theory and the ActAD framework (Figure 9) as an operational (analytical) framework, is used in this thesis. The research methodology to carry out this investigation is presented in Chapter 4.

CHAPTER FOUR: RESEARCH METHODOLOGY

> "Technology is not the product of a unique technical rationality but of a combination of technical and social factors. The study of these factors must include not only the empirical methods of social science but also the interpretive methods of the humanities in order to get at the underlying meaning of technical objects and activities for participants… What it is to be an automobile or a television is settled by social processes that establish definitions of these objects and grant them specific social roles" (Feenberg, 1996).

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4. INTRODUCTION

A research problem was that whilst the potential of e-Learning technology is generally accepted in academia, it is not known how it should be exploited to gain maximum benefits in education. Hence the realities of implementing C/LMSs in a diverse higher education terrain remain fragmented and tentative. As a result, whether current uses of educational technology are adding value or not (and the type of value) remains uncertain. With this uncertainty, financial investments made in developing educational technology solutions remain hard to justify. Further, university administrators, education and curriculum planners, policy makers as well as researchers interested in the field of education, technology, pedagogy and learning remain in the dark. As a result, improvements remain ill-informed and are therefore likely to follow a misguided route with benefits often realised by chance rather than by design. Therefore, the question emerges as to how the social, the technical, and the environmental aspects of e-Learning interact to inform teaching and learning over a C/LMS in higher education spaces?

A research problem, the methodology, methods, techniques of research and the analysis of data are presented in this chapter.

The thesis draws on the ActAD framework in Figure 9 to inform the research instrument and the methodology, which is used to address the main research question. In this respect, a link between the ActAD framework (Figure 9) and the research instrument is elaborated in section 4.1. A research instrument (Table 7) is followed by a discussion of the methodology, possible IS methods and related concepts. The selection of an appropriate methodology and techniques to execute an investigation is motivated for and outlined in this chapter.

A graphical outline of the chapter is presented in

Figure 10.

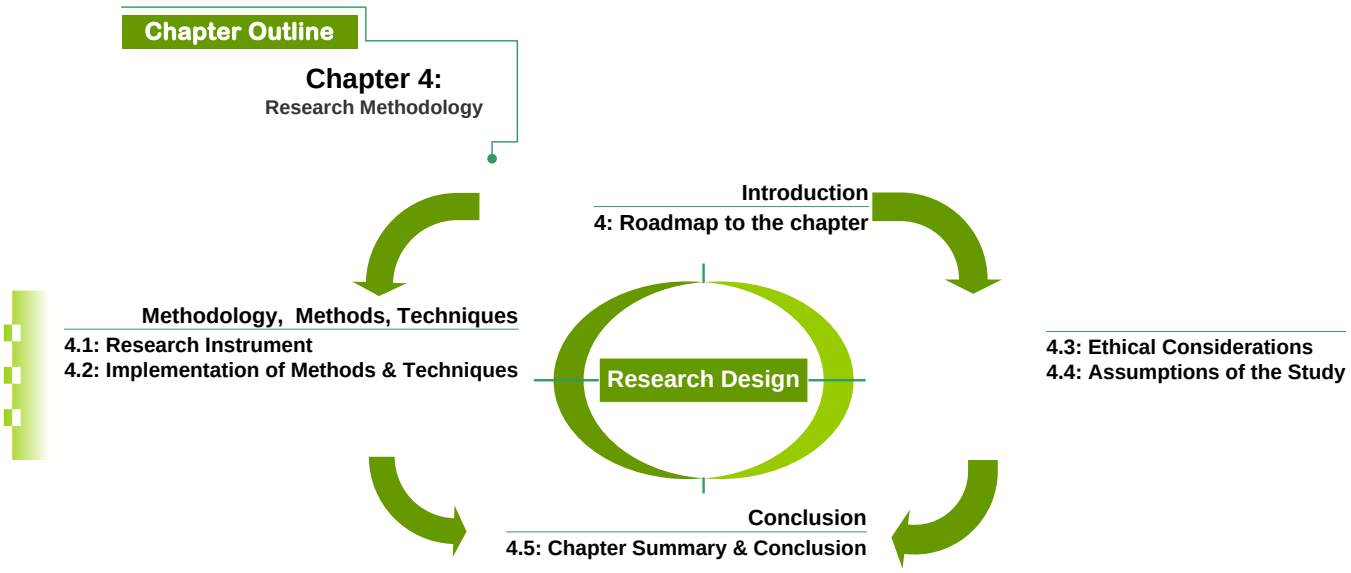

Figure 10: Outline of Chapter 4

4.1 The Research Instrument

Background literature (chapter 2) and the e-Learning ActAD framework (Figure 9) inform the key focus areas of the data collection instrument. The activity theory for example, presents a socio-technical process as a collective work activity that is based on a common purpose pursued by multiple stakeholders (actors). The purpose is to improve the quality of education to facilitate teaching and learning over a C/LMS in academic programs. The ActAD framework suggests that e-Learning activities are determined by the interplay between environmental factors known as mediators. Thus, sub-questions in the research instrument (Table 7) operationalise different factors that mediate e-Learning activities among learners and educators. That is, the dependant variable/s: C/LMS usage, non-usage, and whether the use facilitates different learning styles according to sound pedagogical practices depend on the interplay between the enabling and inhibiting mediators. The mediating factors are categorised into three sets of variables: the social,

the technical and the environmental factors. The social factors address the aspects of the individual actors, such as perceptual and peer influence (motivations), individual purposes and goals (intentions), computer-related experience and skill (capabilities), the actual activities for which a C/LMS is being used (activities), and related procedures. Questions are phrased so as to draw insight into the status of these factors, and its influence on usage or non-usage of a C/LMS by the educator. The same logic is applied in the technical and environmental (institutional) factors. These are translated into seventy sub-questions in the following diagram, Table 7:

Table 7: Research Instrument

	Motivations	Intentions	Capabilities	Activities	Procedures
Social	1. What is the significance of e-Learning in academic education? 2. Is a C/LMS in important for teaching? 3. Why is it important? 4. What are the benefits of using a C/LMS in teaching, for educators? 5. What are the benefits of using a C/LMS for learners 6. Do your colleagues encourage C/LMS usage?	7. What are the purposes for which you use a C/LMS? 8. Why are you using/ not using it? 9. Is usage voluntarily or forced (elaborate) 10. How can one apply a C/LMS to achieve the mentioned benefits? 11. What do you & your students stand to loose if you don't use a C/LMS in teaching?	12. Your experience with computers & e-Learning? 13. Your experience using a C/LMS? 14. Do feel adequately skilled to use the available C/LMS (please elaborate)? 15. Is training available? 16. Adequacy of training, if available (please elaborate)? 17. Recommend a suitable/ preferable format of training?	18. What are you able to do with a C/LMS? 19. Would you rather be doing more with it (elaborate)? 20. How frequently are you using a C/LMS per week (elaborate)? 21. Satisfied with your frequency of using it? 22. If not, please elaborate	23. What are specific procedures you adhere to in teaching over a C/LMS? 24. Any reason that you need to adhere to these procedures (prescribed by policy or out of own initiative)? 25. Are these procedures easy or difficult (please elaborate)? 26. If you had things your way, what would you do differently? (explain your statement)
Technical	27. What the technical necessities of an ideal C/LMS? 28. What are the current technical difficulties? 29. How do these technical difficulties affect your usage patterns? 30. Is the help desk available to attend to technical failures? 31. What is the reaction time of the help desk? 32. How does this affect your usage of the system?	33. Is the technical design of current C/LMS relevant to your teaching needs? 34. What are shortfalls (please elaborate)? 35 Suggest areas of improvement on the program and applications	36. What features do you need in a C/LMS, for it to be useful? 37. Is the system (C/LMS) easy to use (state your reasons)? 38. Is the system adequate in terms of functional speed? 39. Are security features, i.e. prevention of intrusions (spam, viruses, data corruption & theft) adequate (Please elaborate)? 40. How do the shortfalls affect your usage of a C/LMS? 41. What technical solutions do you recommend?	42. What solutions would you prefer a C/LMS to offer your teaching? 43. What is missing (and why)? 44. How do the missing features affect your usage of the system?	45. What do you like about the technical design of the interface? 46. What do you dislike about the technical design of the interface? 47. How do the navigation capabilities in the interface support the usage of the system? 48. What improvements would you recommend?
Environmental	49. How does the institutional policy inform the use of e-Learning, i.e. prescribes, compels or guide? 50. What do you like about the policy? 51. What do you dislike about the policy 52. Is C/LMS usage encouraged in your department (elaborate how)? 53. Does the industry expect the use of C/LMS in education (elaborate why) 54. Are there expectations from other academic institutions that you use a C/LMS in teaching?	55. How do you address industry expectations in your use of a C/LMS in teaching? 56. What can make you stop using C/LMSs 57. Would you recommend the use of e-Learning for educational purposes to another educator (elaborate).	57. What kind of administrative support do you need to effectively use a C/LMS? 58. Is that level of support available at the moment (and why)? 59. What resources do you need to use C/LMS better, in teaching? 60. Are these resources available (and why)? 61. Do you have continuous access to a C/LMS at work and at home	62. Is the e-Learning practice in your department integrated with pedagogy? 63. Are there workshops or discussions between educators in your department about better uses of e-Learning? 64. Is the peer environment supportive to understanding and using C/LMSs?	65. How did you get to know of e-Learning (and the C/LMS) in this institution (how were you introduced)? 66. What are the expected procedures of C/LMS usage in your institution? 67. What do you like about prescribed procedures? 68. What do you hate about prescribed procedures of C/LMS usage (and why?) 69. How do you prefer to use a C/LMS (follow set procedures or use own initiative)? 70. If you would have things your way, how would you use a C/LMS (and why)?

The protocol for interviews with students and lecturers was based on this set of questions. To carry an investigation of these factors however, an appropriate methodology and methods of research was formulated. This is elaborated in section 4.2

4.2 Implementation of IS Research Methodologies

Technologies including e-Learning tools are *"… not the product of a unique technical rationality but of a combination of technical and social factors",* hence the techniques of its analysis "*must include not only the empirical methods of social science, but also the interpretive methods of the humanities in order to get at the underlying meaning of technical objects and activities for participants…"* (Feenberg, 1996).

Research methodologies define the world of science (Mouton, 1996). The adoption of appropriate methods and techniques within a methodology yields insightful observations (ibid.). The three concepts – methodology, methods and techniques – are closely interrelated, to the extent of being used interchangeably, as if they carry one and the same meaning. A research methodology, method and technique are different terms, differing at least at the analytical and abstraction levels (Babbie & Mouton, 2001).

4.2.1 Methodology

The methodological approach is at the highest level of complexity, where the actual methods, techniques and their underlying philosophies are articulated. A research methodology, therefore, refers to a collection of methods, techniques, assumptions and values regarding their use in a given research context (Babbie & Mouton, 2001; Mitrovic, 2008).

The dominant methodologies commensurate with the interpretive research paradigm in IS research are the quantitative, the participatory action research (PAR), and the qualitative research approaches. A choice of a methodology is informed by the research problem, a research question, the type data, data sources, format of sought answers and the required procedures of analysis (Neuman, 2006).

4.2.1.1 Quantitative Research

If the researcher is dealing with non-explanatory, but factually deductive studies that produce empirically abstract data in the form of numbers (Neuman, 2006), this places more emphasis on the assigning of numbers "*to the perceived qualities of things*" (the quantification of constructs) (Babbie & Motoun, 2001: 49).

The aim of the current study is to understand descriptions and explanations of the factors of C/LMS usage, from the contextually subjective environments of lecturers and students in South African universities' e-Learning spaces. The type of data in this instance is mostly in words that may not be converted into a single common medium such as numbers. To this effect, a quantitative methodology, methods and techniques would not be appropriate.

4.2.1.2 Participation Action Research (PAR)

PAR refers to a set of methods (and techniques) of data collection that involve direct and participatory involvement of the researcher to gain first-hand experience through encounter and dialectic dialogue in the environment of the research subject/s (Babbie & Mouton, 2001).

The PAR methodology is used to get a full understanding of the environment of the research subject, often by supplementing "*the purely technical considerations*" of positivist approaches (Morgan, 1983: 403) with practical considerations of the human subjects. In this case, methodologies are reframed to go beyond just the "*epistemological, but ideological, political, ethical and moral*" (p. 404) considerations of an investigation that involves humans. The rise and the maturing of context and environment-conscious approaches in IS research, such as the qualitative methodologies, offer a more useful alternative. Qualitative methodology, methods and techniques tend to strike an appropriate balance between the technical and the social aspects of the socio-technical and context-embedded research.

4.2.1.3 Qualitative Methodology of Research

The qualitative methodology of research refers to a set of methods and techniques of collection and analysing of data in the form of words, impressions, sentences, explanations and context interpretations etc. (as compared to quantitative hard data) (Neuman, 2006). The belief is not to separate the phenomenon of study from the subject, nor the subject from the context, as is often the case with quantitative methods. With a focus on investigating the phenomenon and its context, qualitative research methods allow a richer insight into an observation. The term "method", which is second to the term "methodology" in the hierarchical structure of abstraction, refers to a combination of the practical means by which research activities are to be executed (Singleton & Straits, 2005). A research method, therefore, refers

to the “class and cluster” or collection of techniques that are used to execute each and every research activity (Mitrovic, 2008).

One of the significant contributions of interpretive (or phenomenology) methods has been the development of case study methodological principals that, even if they are not based on positivist criteria, are still consistent with the conventions of positivism (Lee, 1989; Klein & Myers, 1999) and therefore provide a point of convergence between positivism and phenomenology. Qualitative methodology emphasises the observational methods, such as interviewing, analysis of personal documents, or even participant observations (not participant action – PAR), using inductive analytical strategies such as grounded theory, activity theory, content analysis etc. (Babbie & Mouton, 2001).

4.2.2 Research Design

The subject of investigation in this thesis is “the factors that inform usage and non-usage of C/LMS tools in teaching and learning activities in South African universities”. The thesis builds on the findings of preliminary studies – which indicate high levels of motivation for C/LMS usage by learners, and low usage patterns by teachers. Using the work activity theoretical framework as an operational instrument, the investigation is focused on understanding C/LMS usage accounts by educators.

4.2.2.1 Qualitative Techniques

As the main tools of the research trade, the research instrumentation, which includes the techniques, procedures and skills, is located at the least complex, but concrete level of methodological abstraction. Usually categorised and grouped under the “research design” title (Babbie & Mouton, 2001; Kekwaletswe, 2007; Mitrovic, 2008), research techniques include a clear outline of the sources of data, the units of analysis and of observation, operational definition of variables and related attributes, the sampling technique as well as the data analytical tool for the study.

Since usage patterns by learners are affected by the actions or inactions of educators, educators are defined as the main (primary) research subjects, with students engaged only for contextual reference. However, the ActAD framework in Figure 9 (Chapter 3) suggests that there are many other factors that could also influence C/LMS usage. An investigation into multiple factors of e-Learning may call for the use of multiple-sources data. Drawing

data on a single phenomenon of investigation from two or more similar settings may offer more insight. The use of *"multiple sources of data*" is considered to be very "*important in case studies of all kinds*" (Babbie & Mouton, 2001: 282). Four institutions, CPUT, UCT, US and UWC, are used as multiple-research cases in this thesis.

A case study is a method used for intensive investigation of a specific unit of a research population, regardless of the number of variables (Yin, 1994). In a case study the unit of investigation can be an individual (Cooper, 1990), a group (Gilgun, 1988) or even multiple individual units such as teams or communities (Vera, 1990). The units of investigation in the current thesis fit this description. For example, this thesis presents the process of e-Learning as a collective work activity carried out by multiple stakeholders (actors), using tools, rules and procedures to facilitate different styles of learning over a C/LMS. Figure 9 further categorises the actors within the e-Learning work activity into three factors: the entity (institution); the group/s (departments and communities of practice); and individual actors (lecturer, student, network and e-Learning administrator).

Case studies further emphasise the interaction of the unit of study with its context, and taking account of the influences of multi-level social systems on subjects (Babbie & Mouton, 2001). The South African higher education landscape is historically and culturally diverse. The transforming landscape is rooted on the history of cultural and development fragmentation (DoE, 1997), which can be articulated into four legacy clusters: the historically black, geographically and culturally defined universities; the traditional Afrikaans-culture and conservative universities; the former English middle-class universities; and the former Technikons (Universities of Technology) (Jansen, 2003). In this instance, a case study method allows for the selection of an institution from each of the legacy clusters to ensure that insight on the factors of e-Learning is representative of varying environments between institutions. The choice of institutions, therefore, was based on these considerations and on convenience to the researcher. That is, since all four legacy clusters have a representation in the Western Cape, it was convenient to select all representative case within this region. The Cape Peninsula University of Technology (CPUT) represents the former Technikons (CapeTech & PenTech), University of Cape Town (UCT) represents the former English Middle class institutions, University of Stellenbosch (US) (Afrikaans Universities), and University of the Western Cape (UWC) (former, black, geographically and culturally defined universities).

4.2.2.1.1 Units of Analysis and of Observation

The unit of analysis in a scientific research refers to the "*what*" of the study, for example, the "*object, phenomenon, entity, process, or event*" that is being investigated (Babbie & Mouton, 2001: 84). Within the unit of analysis, the exact part or identity, quantity and detail of the phenomenon on which the actual observation will be conducted (the unit of observation) needs to be identified. The units of analysis and of observation are presented in Table 8.

Table 8: Units of Analysis, and Units of Observation

	Group - Institutional level	**Individual Actor**	**Activity level**	
Unit of Investigation	Research population: Higher Education Institutions	Research Population: Educators & Learners	Research population: Teaching & Learning Practices	ACTIVITIES: **Dependant Variables**
Unit of Analysis	South African Universities	S. African University Lecturers & Students	The use of e-Learning tools for teaching & learning	
Unit of Observation	Specific Departments within CPUT; US; UCT; UWC	Samples of educators & learners in specific departments within CPUT, US, UCT, UWC	Factors for usage & non-usage of C/LMSs by educators (& learners)	FACTORS: **Independent Variables**

From the activity theory perspective, the actual teaching and learning activity over e-Learning platforms in Table 8, is the main unit of analysis. The activity, however, is a collective and goal-determined process that is carried out by individuals or groups (known as actors) all working under a set of rules, guidelines, conditions, tools and procedures, to achieve a common outcome.

Institutions (entity), faculties and departments, according to Table 8, constitute group actors who use individual educators to executive the collective motives. Without a common purpose – without the actors and without the tools – there is no activity (no teaching and learning) in the e-Learning activity system. Activities, therefore, cannot be understood outside the goals of the actors, hence the main units of observation in this thesis are educators primarily, and learners on a secondary level, who are used as a reference point. Other components include the working context (social and technical environments), and actors such as the social networks of teachers and learners, administrators, IT network personnel and institutional officials. The units of observation are outlined in the sampling

and data collection sub-sections.

4.2.3 Sampling

Sampling implies the selection of representative units of observations from an otherwise larger and unmanageable research population (Babbie & Mouton, 2001.). Depending on the type of research population, a researcher chooses between probability and non-probability sampling methods.

Under probability sampling, research subjects are selected from a research population whose number and identities are known to, and reachable by, the researcher (Walliman, 2006). This method is used "*to make relatively few observations and generalise from those observations to a much wider population*" (Babbie & Mouton, 2001:164). Random selection of participants from a known list of population elements is often appropriate under this method. The number of elements that make up research populations of lecturers and students in South Africa is neither in a single non-shifting location nor in known fixed numbers. Hence probability sampling techniques were not appropriate for this thesis.

Non-probability sampling method, on the other hand, is based on the selection of the not-readily identifiable subjects of observation, from an identified research population (Singleton & Straits, 2005). As such, participants are selected using "*non-probability techniques relying on the judgment of the researcher…*" (Walliman, 2006:76). A number of non-probability sampling techniques include the snowballing, quota sampling, selecting of informants and purposive sampling. As elaborated in the following section, the latter technique was applied in this thesis.

4.2.3.1 The Purposive Sampling Technique

Also known as judgmental sampling, the purposive technique is used according to the researcher's judgment and aim of the study, to "select units that are representative of the population" (Singleton & Straits, 2005). The technique is applied mostly when a researcher has clear characteristics of the participants needed. These characteristics are used to target a small representative subset that will enable a reasonable element of generalisation about the target population (Babbie & Mouton, 2001). Under this technique, the researcher

only goes to the members of the population that are most likely and prepared to supply the required information (Kumar, 2005).

For this thesis, the lecturers and learners in local universities were identified as the research populations. In compliance with the ethical codes of behaviour, permission to conduct interviews with subjects at their points of work were requested and secured. The weakness of this technique, however, is that "… *making an informed selection of cases requires considerable knowledge of the population before the sample is drawn*" (Singleton and Straits, 2005:133). Since the sampling technique was based purely on the interpretive epistemology, emphasis was placed on the purpose of the participant characteristics – rather than the quantitative statistical or numerical proportion of participants to the sample (Babbie & Moutoun, 2001). On the basis of preliminary studies, and on the researcher's familiarity with learning environments in respective institutions, the researcher's knowledge of the environment was not a limiting factor. For example, having studied and worked in e-Learning environments in the four universities being studied, this researcher had practical experience with respective institutional environments.

4.2.3.2 Selecting the Units of Observation from the Units of Analysis

Reflections on a historical context of the South African system of higher education help clarify rationale for the selection of specific institutions in the sample of this thesis.

The South African higher education landscape is historically and culturally diverse. The transforming landscape is rooted on the history of cultural and development fragmentation (DoE, 1997), which can be articulated into four legacy clusters: the historically black, geographically and culturally defined universities; the traditional Afrikaans-culture and conservative universities; the former English middle-class universities; and the former Technikons (Universities of Technology) (Jansen, 2003). In effect, there are 21 universities (5 universities of technology and 16 traditional universities) in South Africa. Institutions in the two categories can further be categorized into four clusters. The first two clusters are the former white and English language universities, and the former white, Afrikaans universities (Jansen, 2003). These institution are renowned for being well-resourced, and often, inclined towards specific culture, i.e. Afrikaans and English culture. The other two clusters are the previously black as well as the coloured and Indian universities – which are often under-resourced (Cooper, 1995). Given differences in their economic muscle,

wealthy institutions tend to develop faster, acquire more infrastructure and better qualified personnel than the under-resourced institutions (DoE, 1997). Further, they tend to attract a specific calibre of students, i.e. within a specific economic, social and cultural background (Davies, 1996). The majority of Afrikaans cultured students for example, are most likely to prefer Afrikaans institutions such as the University of Stellenbosch, etc. Whilst these cultural identities remain evident in the post apartheid South Africa, students have become more mobile and are willing to move away from their home regions, still to attend to institutions of their socio-cultural preference (Mlitwa, 2005). Clearly, because institutions are at different levels of economic, infrastructural and cultural developments, differences in innovations, technology acquisitions and adoptions of e-Learning systems and in other developments - remain a strong possibility.

When studying about the population of university institutions, incorporating this diversity in one's sample would improve the generalize-ability of the study. To this end, a larger institution within each of the clusters was selected into the sample of this study. In this instance, a case study method allows for the selection of an institution from each of the legacy clusters to ensure that insight on the factors of e-Learning is representative of varying environments between institutions. Among the former English, wealthy and more developed universities for example, the University of Cape Town (UCT) was considered more appropriate, in particular because of the national make up of its student population, albeit, within a specific culture (rather than race) of students. Similarly, the University of Stellenbosch where the medium of instruction remain Afrikaans was selected on the basis of both the size, culture and the national make-up of its student population. As a traditional coloured university however, the University of the Western Cape is similar to other black institutions, both in terms of culture, development status and in terms of numbers of black and coloured students. Finally, unique characteristics of the Cape Peninsula University of Technology – where one of its larger campus (Bellville) represents the former black Technikons (Pentech) whilst the Cape Town Campus represents the former White and well resourced Technikons (Cape Tech), was selected in the same manner as the other three institutions.

The choice of institutions, therefore, was based on these considerations and on convenience to the researcher. That is, since all four legacy clusters have a representation in the Western Cape, it was convenient to select all representative cases within this region.

It must be emphasized however, that the aim of method of this process of sampling is not to make proportional representative numbers of the research population – but strictly informed by the purpose of the investigation. The selection of departments was done randomly, using the criteria of mixing natural sciences with social sciences so as to accommodate possible discipline-based differences (Table 16). Whilst the researcher had no control of the age, gender and racial mix of the academic personnel in university departments, a fair mix of participants aged, from 20 to 45 years of age on the one hand, and those who are 45 years and older, were considered in the sample selection.

4.2.3.3 Sample Size and Generalize-Ability of Findings

Just as the political, cultural and the socio-economic landscape of South Africa continue to reflect the legacy of apartheid, so is the South African higher education system. The higher education landscape and populace continue to reflect the geographical, socio-cultural and economic characteristics in the transforming post 1994 democratic dispensation. For a study about the South African university community to be representative therefore, the sample should be representative of the cultural and the socio-economic make up of the higher education institutional landscape.

The former black and coloured Technikon (Peninsula Technikon) where the majority of students are blacks and coloured, which merged with the former white and Afrikaans Technikon (Cape Tech) where the majority are the white English and Afrikaans students, in large numbers from various areas in South Africa was a fairly representative sample of the university of technology population. The universities of Cape Town, Stellenbosch and the Western Cape were equally representative of their respective populations of universities in South Africa, were selected on the basis of their characteristics upon which generalisations on the wider institutional populations can be drawn. On this basis, the results are considered adequately generalise-able, to the extent that should the same study be conducted in other similar institutions other than the ones included in the sample, it is expected that – due to similarities in institutional and population characteristics, that results would be fairly similar.

4.2.4 Data Collection

Data collection techniques in qualitative research include simple observations, participant observations, basic individual interviews, in-depth interviews and focus-group interviews (Singleton & Straits, 2005; Neuman, 2006). Participant observation offers an insider perspective of the investigation because the researcher becomes a member of the group being observed (Babbie & Mouton, 2001). This level of intensity in an observation is necessary when emotional and psychological determinants of behaviour that cannot be fully understood through outside forms of observation, are observed.

In contrast, simple observation that includes the viewing of personal documents, actual observance of people's activities and recording them, or doing statistical audits with the researcher, offers the outsider perspectives on an observation. In this thesis, structured and semi-structured, one-on-one interviews with educators, and focus-group interviews with students are used to collect primary data.

Secondary data which informs theory, concepts, methodologies and background, is drawn from pilot studies, the existing literature dealing with local and international practices and trends, as well as the theoretical work in the field.

4.2.4.1 Basic and In-depth Interviews

Whist basic interviews can only scratch the surface in terms insight depth, in-depth interviews dig into a much deeper level of an investigation to uncover the underlying detail. For a deeper understanding of the dynamics of usage and limited usage of C/LMSs by educators in South African universities, in-depth interviews were held with selected samples of lecturers in four universities in the Western Cape region of South Africa. The sampling of educator participants per institution is shown in Table 16 under Appendix 1 at the end of the thesis.

Twenty-two lecturers were selected across the four universities in the Western Cape and interviewed between May and July 2007. Starting with CPUT, a total of six lecturers within the Faculty of Informatics and Design (FID) were chosen on the basis of their observed interest (and lack of interest) in e-Learning.

The responses to interview requests from the majority of academics at the US were not positive. This was largely due to the timing, as the interviews clashed with exams and the vacation. Therefore it was difficult to secure a substantial number of interviews. Only three lecturers, from the Department of Political Studies, the Dutch and Nederlandse Department and the Geology Department (selected on the basis of their availability), and one administrator (a senior coordinator) of e-Learning, were interviewed at the US.

A total of seven academics across the departments of African Studies, Economics, Political Studies, Religious Studies, Information Systems and Management Studies were selected and interviewed during the month of June 2007 at UCT. The aim of sample diversification was to draw experiences from a broader combination of disciplines and academic backgrounds. The same logic was used in selecting five participants: three educators from the Department of Information Systems (IS) and two lectures from the Department of Political Studies at UWC.

To ascertain students' preferences of educational technology, focus-group interviews with students were held ahead of lecturer interviews so as to inform the discussions with lecturers.

4.2.4.2 Focus Groups – Interviews with students

A focus group is a carefully moderated group interview. It is designed to obtain the perceptions of the members of a selected group on a defined topic (Langford & McDonald, 2003). Focus groups are used for many purposes, including the evaluation of related research and the stimulating of new ideas and concepts (ibid.). Focus groups may be conducted in a number of formats, including participation in "creative participant activities", "questionnaires", using "mood boards or collages" or just "focus group discussions" (Langford & McDonald, 2003: 23-24).

One advantage of the focus-group technique is that it enables the interviewing of a number of people at one point, thus saving time and human resources. The face-to-face characteristic allows the moderator to motivate participants to give more information than would have been the case with mailed questionnaires. The moderator may further adjust to body language changes, facial expressions, and other signs that suggest a loss of interest – to encourage more information inflow (ibid.). In addition, it is relatively easy to assemble

participants. It is cost effective and procedurally convenient in terms of flexibility in the formats of questions and responses. For example, open discussions allow participants to confirm their contributions (Carey, 1995). Spontaneity in responses further makes the discussion less strenuous for respondents in that respondents may not need to answer every question, but build on each other's statements (Morgan & Spanish, 1984). Focus groups further empower the researcher (or moderator) to dig into deeper meanings at the luxury of getting responses from multiple viewpoints. In this respect, participants even critique each other's input, challenge factual errors and extreme views (Carey, 1995).

Not all focus-group techniques are appropriate for every purpose, but a format that draws deep insights from a selected group of participants is important. For example, whilst the "creative participant activities" technique is more relevant for task-related enquiries, it would not be appropriate for a broader discussion of a specific topic. Questionnaires are also inadequate for drawing out the required details, and for enabling the desired flexibility of responses. Similarly, "mood boards" techniques require the use of specific images whilst other techniques cover different aspects of a subject. The "focus group discussion" technique, on the other hand, is relevant to the type of investigation that is followed in this thesis in that it pushes to reveal experiences and reasons for behaviour (Langford & McDonald, 2003).

4.2.4.3 Selection of Focus Group Participants

Participants are chosen on the basis of their individual characteristics (relative to the topic) through the purposive sampling of participants belonging specifically to identified groups (Morgan, 1998). Sample size may vary between the following formats of focus groups: the mini groups (between four to six participants, over 90 to 120 minutes), or the telephone groups (using telephone conference systems, over 30 to 120 minutes), and full groups. A full group has between eight and ten participants, and runs between 90 and 120 minutes (Greenbaum, 1998). In this study a full-group format was considered to be the most suitable, because it engages with a substantial number of participants over a reasonable length of time.

Participants were drawn from the samples of the most regular to the least regular (or none) users of ICT (and e-Learning) facilities. For discipline representativeness, participants were selected from the faculties of (i) humanities (ii) commerce, and (iii) natural science

disciplines in each of the following institutions: CPUT, UCT, and UWC.

As shown in Table 17 (under Appendix 1), forty students were selected from different academic disciplines across three different institutions in the Western Cape. In a more detailed description, four focus group interviews were held with a group of ten (10) students at CPUT (Cape Town campus) and another ten (10) students at CPUT Bellville Campus. Another two focus group interviews were held with ten (10) students who were selected from different disciplines at UCT, and finally, the last focus group interview was held with students from mixed disciplines at UWC during the months of May and June in 2007. The process was followed in the sample selection process, and the related ethical considerations are discussed in detail in respective sections later in the thesis.

4.2.4.3.1 CPUT Focus Group

As an example of how students across the four universities were selected to participate in this study, the sampling of CPUT students is shown in Table 9.

Table 9: Sampling of CPUT Students for Focus Groups

Institution: CPUT

Faculty: Informatics & Design (FID), BTech, 4th year multidisciplinary students, 2007
Date, time, venue: (1) 05 May, 2007; 9h30 – 12h00; **Room 1.31**, 80 Roeland Str. CPUT, Cape Town
(2) 12 May, 2007, 9h30 -- 12h00; Main Lecture room, Computer centre, Bellville

Total Students at University	Total Students in the Faculty of Informatics and Design	Selected sample					
		Gender	Race: **B**–Black, **C**–Colored, **I** - Indian, **W**-white				
			B	C	I	W	Total Sample
Cape Town Campus	2, 072	Male	2	1	0	2	5
		Female	2	1	0	2	5
Bellville Campus	1, 137	Male	2	1	0	2	5
		Female	2	1	0	2	5
		Male	**4**	**2**	**0**	**4**	**10**
		Female	**4**	**2**	**0**	**4**	**10**

Explanatory notes:

- Race or gender differences in student ICT usage patterns ranged between insignificant to non-existent in preliminary studies. On this basis representative sampling would not add value. Numerical representativity of the sample therefore, was never pursued. Instead, the objective is to explain the already uncovered facts.
- The 4th year (Btech) Class in the Faculty of Informatics & Design is characterized by students from deferent undergraduate backgrounds from the two merged campuses (Cape Tech, Cape Town; and Pentech, Bellville).
- Being 4th years, they have been on campus for a reasonable number of years to have an adequate background and experience of ICT interventions in the university.
- Campus, gender, race and the number of years a student has been at university were important criteria for the selection of focus-group participants.

As shown in Table 9, twenty students were selected across different race and gender lines to participate in two focus-group discussions at Cape Town and Bellville campuses at CPUT. Participants were selected according to race, gender and across academic disciplines, in all participating institutions.

4.2.4.4 Data Analysis

Positivist and interpretive paradigms do not only differ in the underlying principles and methodologies they employ, but also in the data analytical approaches used. The positivist paradigm employs established fixed rules for analysing data. Due to the contextual and often qualitative nature of data under the interpretive research paradigm, a choice of the analytical approach is largely based on the aim of the analytical process.

With regard to qualitative research, there are "*no clearly agreed rules or procedures for analysing qualitative data*" (Ritchie & Lewis, 2003: 200). Instead the objective, an investigation and the type of data sought, is used to choose between a number of analytical approaches. Qualitative research often chooses between the following methods of data analysis: ethnographic analysis (Hammersley & Atkinson, 1995); life histories (Thompson, 2000); narrative analysis (Riessman, 1993); discourse analysis (Silverman, 2001); conversational analysis (Silverman, 2000); analytical induction, policy and evaluation analysis (Ritchie & Spencer, 1994); grounded theory (Strauss & Corbin, 1998); content analysis (Berelson, 1952; Robson, 2002); and the computer-assisted qualitative analytical methods (Ritchie & Lewis, 2003).

As a means of translating data into information, data analysis methods ask of researchers to explicitly and implicitly reflect on their research practice (Mouton, 1996). A qualitative researcher is also required to motivate for a chosen data analysis approach.

A choice of content analysis as an analytical method for the qualitative data in this thesis is elaborated in the following section.

4.2.4.4.1 The content analysis approach

Content analysis is a method which:

> "…examines words or phrases within a wide range of texts, including books, book chapters, essays, **interviews** and speeches as well as informal conversations and headlines. By examining the presence or repetition of certain words and phrases in these texts, a researcher is able to make inferences about the philosophical assumptions of a writer, a written piece, the audience for which the piece is written, and even the culture and time in which the text is embedded" (Palmquist, 1993).

Content analytical methods, therefore, enable a balanced translation of the content and context of data documents (be it interview transcripts, reference papers or other content documents) into meaningful information (Berelson, 1952) and are certainly suitable for the analysis of interview-related data.

In this method the researcher identifies themes, with a focus on the frequency with which the theme is presented and on how it is presented (Robson, 2002). The theme is then linked to outside variables – which, in the case of this study, are the mediators of C/LMS usage by educators. In fact, since the interview transcripts make up the bulk of the primary

data that must be analysed in this thesis, the content analysis technique is adopted in this study. The e-Learning ActAD framework informs the bulk of the themes that are used to categorise data in this thesis. Data is then presented in a discussion format within the corresponding themes in Chapter Five.

4.3 Ethical Considerations

The research process complied with research codes of ethics for each of the institutions studied. On completion of the study proposal, the researcher satisfied the ethical requirements of the UCT ethics committee, and was granted an ethics clearance certificate to proceed. Ethical consent was also obtained from research departments of sister institutions: UWC, CPUT and US.

In addition to institutional clearances, letters introducing the research, its purpose, value and clarity on how the data would be collected and used, were sent to participants requesting informed consent to participate. Letters also clarified the level of participation expected from the participants. It was also undertaken to protect the confidence and anonymity of the participants where this was needed (Lewis, 2003). Ethical clearance letters, letters of consent and individual acceptances of request to participate are annexed in the appendices section.

4.4 Assumptions, Based on Background Studies

On the basis of the background studies in South Africa by Mlitwa (2005), America (2006), Czerniewicz et al. (2007) as well as international studies by Middlehurst (2003), OECD (2005), Sangra (2008), CCL (2009), Bates (2009) and Smith Jaggars and Bailey (2010), this study puts forward a number of assumptions. Firstly, that institutions are adopting (in the tool acquisition sense) ICT for teaching and learning. Secondly, on the basis of the paradox that emerged between positive beliefs on the potential of technology and the low patterns of usage by educators, it is anticipated that ICT usage in teaching and learning will neither be integrated with, nor informed by, pedagogy. A gap between technology adoption and usage is also anticipated. Thirdly, usage of ICT is not likely to be campus-wide in all institutions, though explanations remain difficult to predict.

4.5 Conclusion on Research Methodology

This chapter outlined the means by which the pursued investigation is to unfold. The introductory section links the research instrument (sub-questions in Table 7) with the process of answering the research question. The methods that are commonly used in implementing information systems research are then discussed in detail.

The case study method of investigation, where a purposive method of sampling is used to select the units of analysis and observation (participants) is used in this thesis. Within the institutional research population, the South African universities in particular are the units of analysis. The four universities in the Western Cape – CPUT, US, UCT and UWC – are selected as a representative sample of the population of university institutions. These are presented as the units of observation. At the individual actor level, educators and learners across different disciplines (faculties) were selected as main units of investigation. On a more specific level, the South African lecturers and students were the study population, whilst specific educators and learners within departments in the four representative universities were the units of observation (Table 16). In-depth interviews with educators (Table 16) and focus-group interviews with students in Table 9 and Table 17, are the primary-data collection techniques used in this study.

Data analysis methods in qualitative research were also discussed. To this effect, content analysis is selected as an appropriate method to analyse data in this thesis. The ethical status of the research process followed in this study was declared as clear. In closing, assumptions are drawn from preliminary findings to anticipate high acceptance of a C/LMS by students and lecturers. In the light of preliminary studies, positive perceptions are not expected to be supported by high usage of these systems in academic programmes. Where C/LMS may be used, the use is least likely to be tentative rather than based on sound pedagogical principles. This is one of the main issues that are being explored in this thesis. Technical failures in these systems and poor understanding of a link between e-Learning system usage and pedagogy are also anticipated in the findings of the current study. Whilst explanations are unknown, they remain the main focus of this investigation.

The findings are presented in the following chapter (Chapter 5).

CHAPTER FIVE: FINDINGS

5. INTRODUCTION

The aim of this investigation is to explain the factors that inform adoption and use of Web-enabled tools of e-Learning by educators in South African academic institutions.

The activity theory was used to develop the e-Learning ActAD analytical framework in Chapter Three. The ActAD framework was, in turn, incorporated into the research instrument, and is used as an analytical lens (using the content analysis technique) to understand the factors of adoption and use of a C/LMS in e-Learning processes in this chapter. In the ActAD framework, e-Learning is viewed as a purpose-driven and a collective work-activity system (Mursu et al., 2007). Individuals, groups and/or entity (institution) actors within this activity system have specific goals towards a common objective, purpose and in pursuit of a common outcome. The interplay between the enabling and inhibiting factors (the mediators) within the activity system determines the activities and nature of the outcome (ibid.). Whilst the activities and the nature of the outcome (desired or undesired outcome) represent the dependent variables, mediators are the independent variables. Activities in this instance are a function of the actors, objectives, rules and actions. Mediators, on the other hand, represent the strategies, procedures, perceptions, intentions, tools and skills (Mursu et al., 2007) as well as the social and technological environments of e-Learning (Du Plooy & Roode, 1999).

This chapter is structured into three major sections. Sections 5.1 to 5.3 offer a descriptive presentation of (rather than a critical engagement with) the findings. Starting with the institutional goals/objectives in the e-Learning ActAD framework in Figure 9, an introductory overview (description) of goals of in the four universities, as embedded in C/LMS adoption regimes, is presented in section 5.2. However, since the focus of this investigation is on C/LMS usage by lecturers, students were interviewed only to offer background and inferential insight. To this effect, student interviews are presented as a preceding background in section 5.3 (ahead of the lecturer findings). A critical discussion of findings (with explanations) is presented in section 5.4, followed by a conclusion of the chapter in section 5.5. A road-map to this chapter (Chapter 5) is outlined in Figure 11.

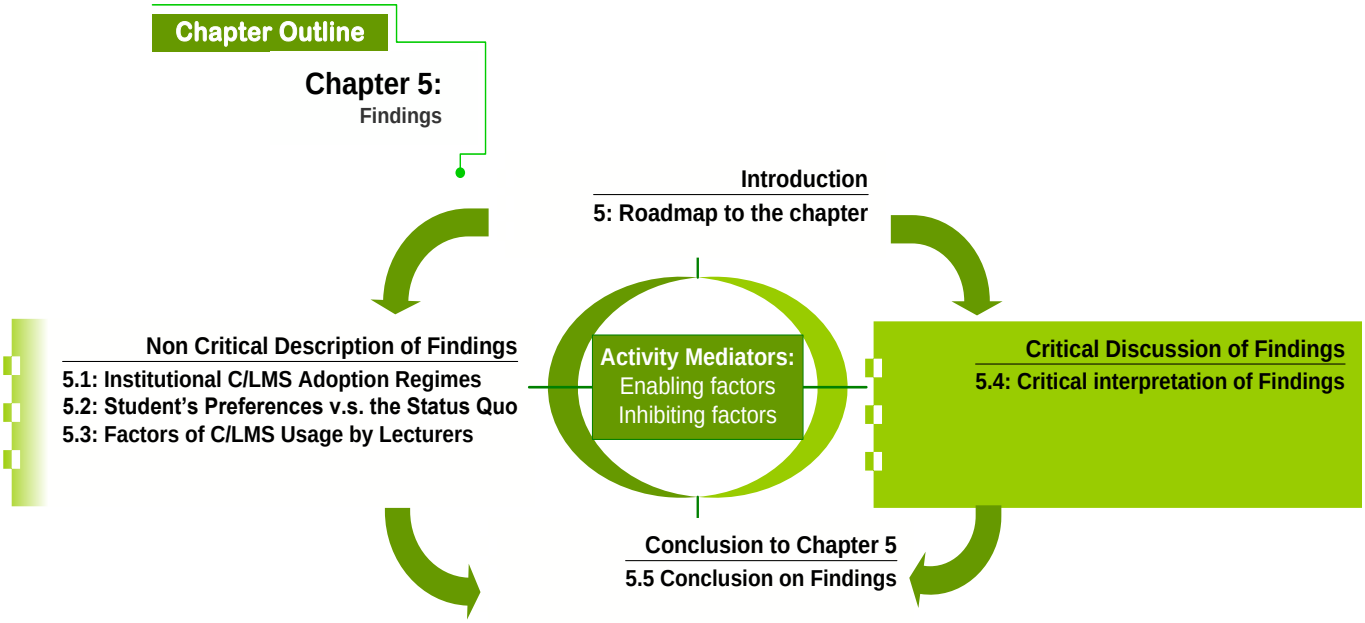

Figure 11: Outline of Chapter 5

5.1 Descriptive Presentation of Findings

5.1.1 C/LMS Adoption Regimes at CPUT, UCT, US and UWC

All four sampled universities – CPUT, UCT, US and UWC – have acquired one form of a an e-Learning system or another, either by contracting a proprietary brand on annually renewed licenses or have developed own open-source software-based (OSS) system. An overview of C/LMS adoption regimes in the four universities is presented in Table 10.

Table 10: Overview of Institutional C/LMS Regimes

Institution	System	Code initiative * OSS or Pty	Date of Adoption (Refs**)	Managing Unit	System Objective
CPUT	WebCT/ Blackboard	Pty	2001**	Centre for e-Learning: www.cput.ac.za/elearning/	Support use of C/LMSs for teaching & learning
UCT	SAKAI/ Vula	OSS	2006**	Centre for Educational Technology (CET): www.cet.uct.ac.za/	Support teaching, learning & educational collaborations within the university.
UWC	KEWL Next Gen	OSS	2000**	e-Learning Development & Support Unit: http://elearn.uwc.ac.za;	Web-enabled tool to facilitate teaching & learning
US	WebStudies / Blackboard	Pty	1999**	Centre for Teaching & Learning (CTL): http://stbweb02.stb.sun.ac.za/ctl/elearning.html	Maximise use of e-learning tools to enhance quality of teaching & learning at US.

Explanatory Note: *OSS = Open source based, home grown initiative; Pty = Proprietor owned system on an annual licence fee

**Refs = CPUT: Smit (2010); UCT: Marquard (2010); US: Van Rooyen (2010); UWC: Keats (2003).

Table 10 offers an operational description of the components of a C/LMS (as introduced in Figure 4 earlier in chapter 2). Generic components of a C/LMS (Figure 4) are the institutional goals (objectives) on e-Learning, rules (policies, strategies and procedures), people (participants) or human actors (subject instructors, section designers, e-Learning and network administrators, as well as the students) and finally, the means (tools, procedures and activities). This section presents the first set of e-Learning goals in the work activity system: the institutional goals. University goals on C/LMS usage are presented in an operational descriptive format, in the form of C/LMS regimes reflecting the type of a system (identified by the developer brand) as embedded in the design of system functionalities and user rights for lecturers (including courseware developers) and students. The functionalities, e-Classroom spaces and user rights in this instance are purely institutional, in the sense that systems are acquired or designed and administered by dedicated units of the institution/s before users get to know about them. Users

only come in as service recipients who have to work with, and adjust to, what is given by the institution (and its supporting units).

5.1.2 The WebCT/Blackboard C/LMS at CPUT

As shown in Table 10, the Cape Peninsula University of Technology (CPUT) has been using a proprietary system, WebCT/Blackboard as its e-Learning tool since (and before) the merger of the Cape and Peninsula Technikons in 2005 (Smit, 2010). The institutional objective, for which WebCT is provided at CPUT, is to generally support teaching and learning in ways that supplement rather than replace existing educational processes (ibid.). WebCT is administered, maintained and implemented by a dedicated unit, the Centre for e-Learning, which is located at the Cape Town Campus. The centre drives usage, designs user training programs and encourages educators to attend training and to use a C/LMS in their courses (Smit, 2010). The Centre for e-Learning in this instance is presented as the driver, with educators only following the lead of the Centre (rather than taking the initiative) in this format of e-Learning practice. Figure 12, Figure 13 and Figure 14 are used to outline the structure of WebCT as used at CPUT.

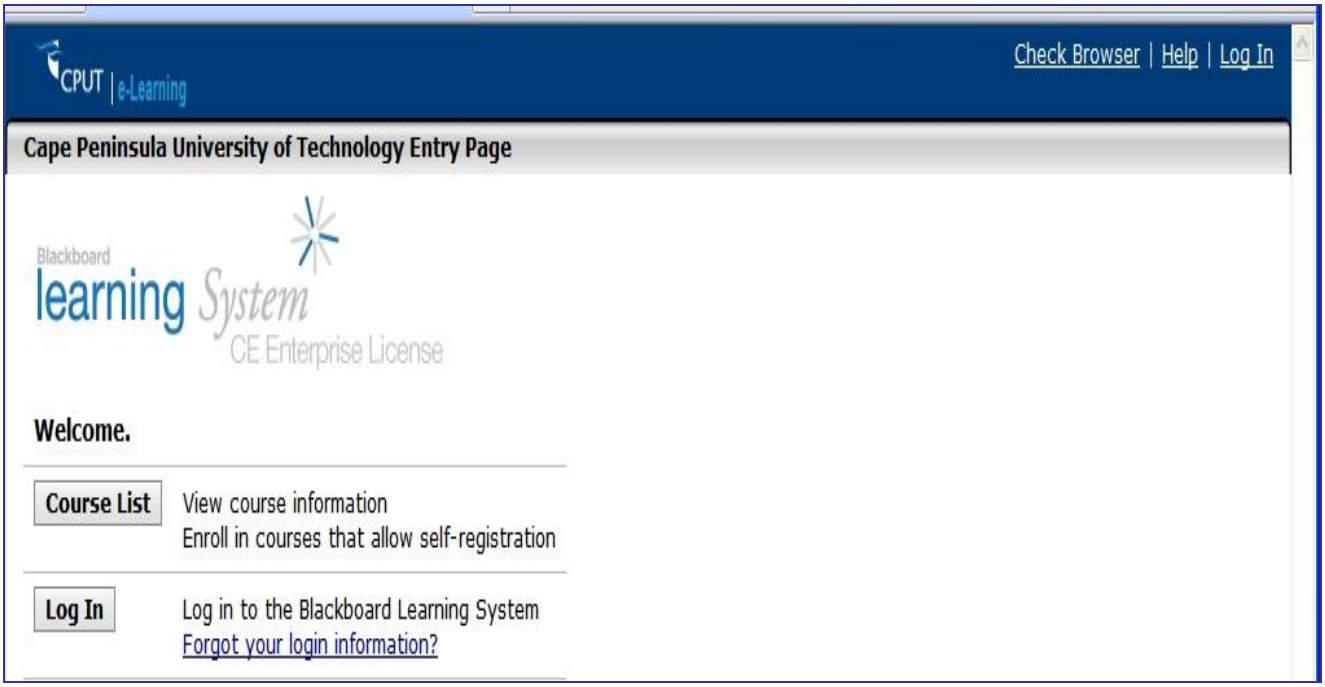

Figure 12: WebCT e-Classroom Entry Interface

Source: http://eclassroom.cput.ac.za/webct/entryPageIns.dowebct

Lecturers are registered by officials at the e-Learning centre into a C/LMS. They are allocated rights to design, administer, to manage the course, to perform teaching tasks and to enrol students into their courses on an e-Classroom platform (Smit, 2010). Lecturers use their general network user-name and a special password to access and use a C/LMS. All courses are linked to WebCT, but are not automatically activated for immediate access and use by students. So, lecturers are required to still register each student that is taking their course on a C/LMS. The impact of this administrative task on the work load of lecturers is elaborated and critiqued under the discussion of findings later in this chapter.

To access the WebCT/Blackboard system, users click on the e-Learning icon on the university main website, which takes them to the entry page shown in Figure 12. Upon a successful log-in, a lecturer proceeds to the e-Classroom (or user interface). As shown in Figure 13, a lecturer or a student can see and select any of the courses for which they have access rights in the e-Classroom space.

Figure 13: WebCT Post log-in page

Source: http://eclassroom.cput.ac.za/webct/urw/lc4130001.tp0/cobaltMainFrame.dowebct

Figure 13 outlines the space and functional rights that a lecturer has in an e-Classroom environment. In this image, a lecturer enjoys full access rights to any of the courses, and to the content management indexes. These are shown on the top left and horizontal side of Figure 13. The following features, the “calendar, “to do list” and “grades” (access to one’s grades), are also available on the left panel. So far, the features tend to be more administrative rather than anything else, in that they support preparations and planning. Secondly, they set the operational boundaries on what a lecturer can and cannot do on the e-Classroom. For example, a lecturer can only use the features and functionalities that are available on the e-Classroom, and only according to programmed procedures. This important dimension of e-Learning is discussed more critically under the discussion section in section 5.5 later in the chapter.

Otherwise, upon accessing a course on this screen, a lecturer may choose to work on building the course or to perform any of the teaching functions by clicking on the icon ‘build’ or ‘teach’ on the top-left tab (first tab) of the e-Classroom window. A student on the other hand, would only have access to the student section entitled ‘student view’ as shown on Figure 14.

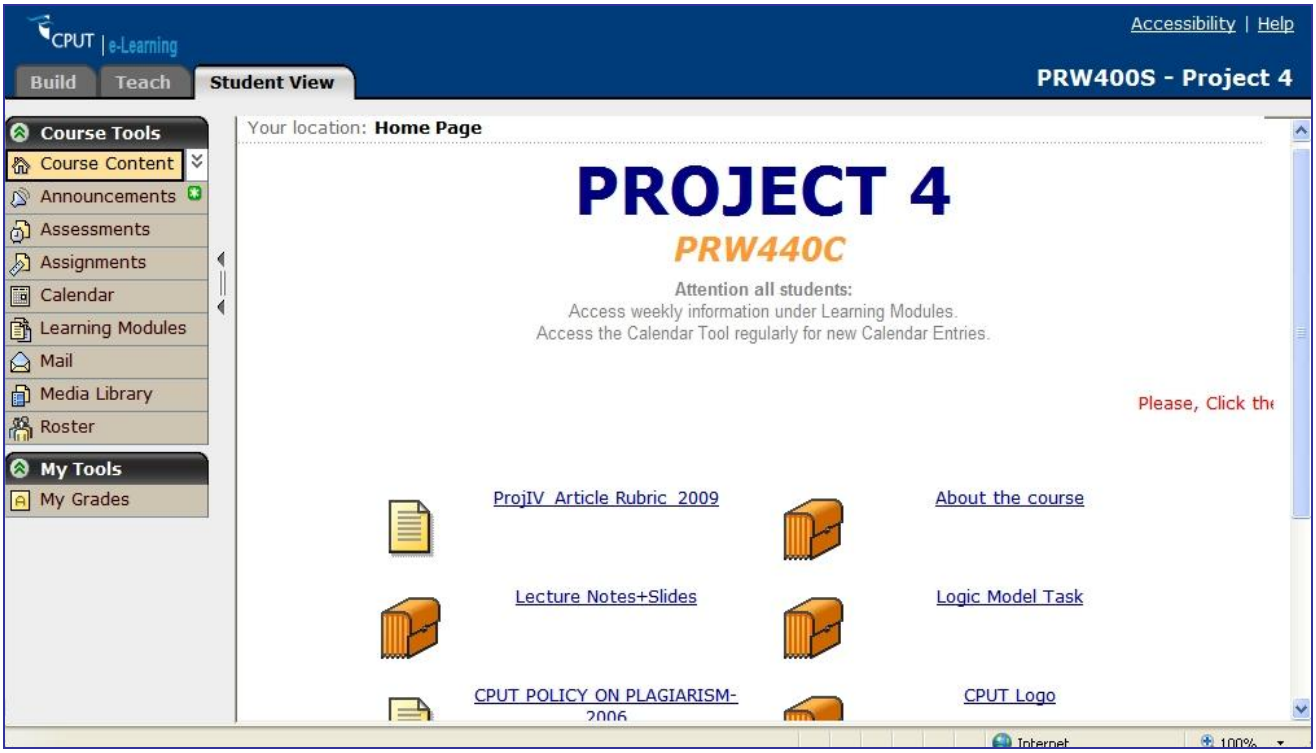

Figure 14: WebCT e-Classroom Student view page

Source: http://eclassroom.cput.ac.za/webct/urw/lc4130001.tp0/cobaltMainFrame.dowebct

Upon entry into the 'student view' section of a selected course, a student is able to choose any of the e-Classroom options on the left panel of the student view window. The options (tools) are the: course content, announcements, assessments, assignments, calendar, learning modules, mail, media library, the roster, and my grades. The first tool (icon) entitled 'course content' which is open in Figure 5, shows folders with various contents that are accessible by the student.

Deducing from available options on this page, it is clear how the C/LMS may be put into use at CPUT. Information handing and exchange functions such as content repository tools under the course content and learning modules; communication tools under announcements, calendar, mail and the media library functions seem predominant. The third function open to student view is that of assessments, assignments and a way of communicating this information to learners under my grades. Whether these tools are adequate, and whether they are being used efficiently, is explored broadly under the discussion of findings later in the chapter.

5.1.3 The Vula C/LMS at UCT

UCT has been using Vula as its C/LMS since 2007. Vula, which means 'open' in several South African languages, is an open-source learning, collaboration and research content management system (Vula Portal, online). Vula was acquired to replace a more costly, inefficient and bug-prone (susceptible to frequent functionality failures) proprietary WebCT/Blackboard platform at UCT (Marquad, 2010). Vula is built on a technology developed by a consortium of universities including UCT, the Massachusetts Institute of Technology (MIT), Stanford, the University of Michigan and the Indiana University among many others within the Sakai Project around the world (Sakai.org, Online).

Managed and implemented by the Centre for Teaching and Learning (CET), the institutional goal of Vula is to '*open up the UCT community to networking, collaboration and learning opportunities*', as well as to '*to open a space for innovation, discovery and exploration*', first and foremost, by ensuring its '*accessibility 24 hours a day, 7 days a week*' to all its registered users (Vula Portal, online). In line with the assumptions of the ActAD framework in Figure 9, it is clear from the onset that the objectives of this C/LMS are both institutional

and individual (teachers want to teach, and students want to learn). The objectives are also to further the academic, innovative and collaborative goals of the institution.

Figure 15 and Figure 16 outline the structure of Vula as used at UCT.

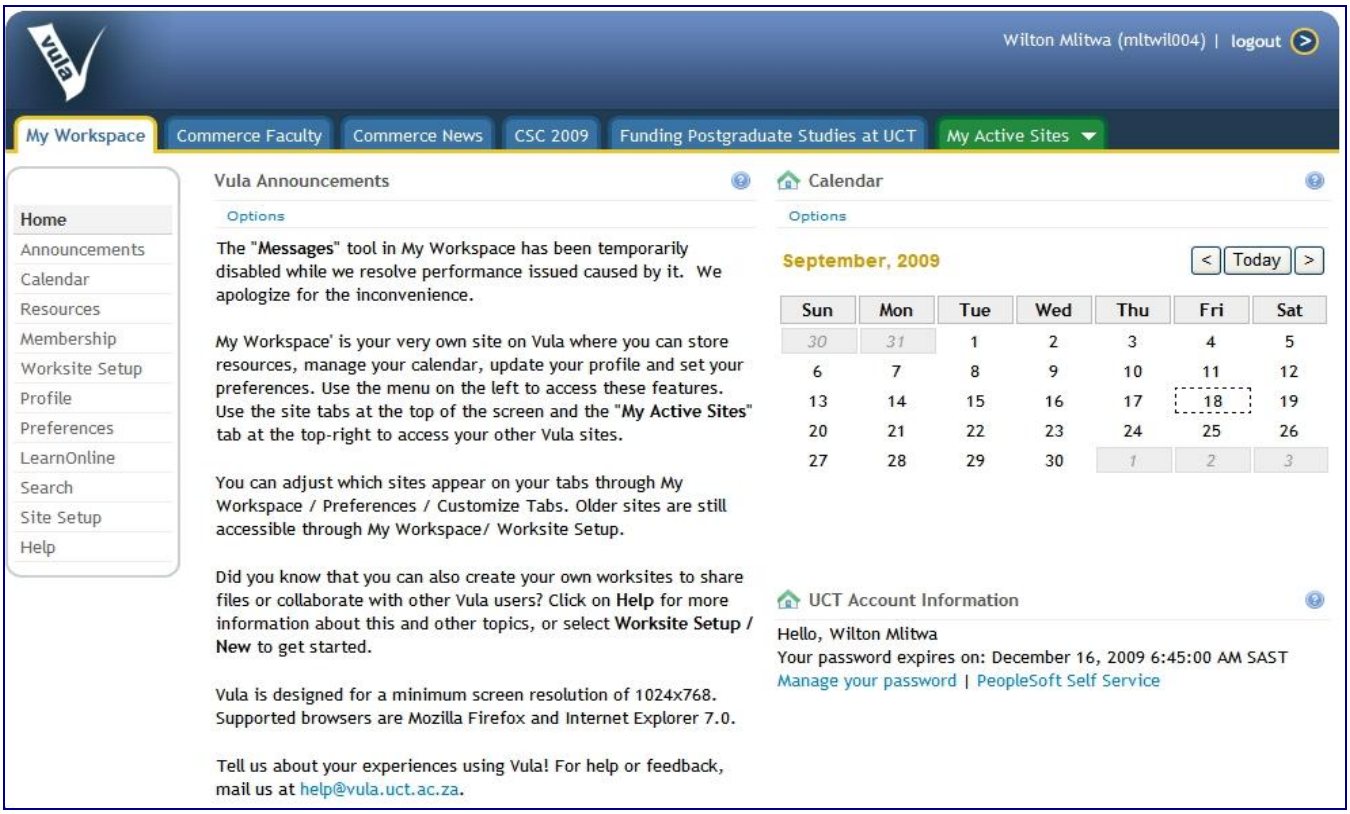

Figure 15: The Vula C/LMS at UCT

Source: https://vula.uct.ac.za/portal/

However, since this section presents only the institutional (and not the learners') perspectives of 'what the students' interface should be, a critique is reserved until the findings on students' interviews later in the chapter.

From the institutional perspective, Vula is centrally linked to all the courses (Marquard, 2010). Unlike the CPUT pattern where educators manually enrol each student into each course on WebCT, students are automatically registered and can use their central network log-in user name and password to access Vula as soon as they are centrally enrolled into the course at UCT (ibid.). The impact of this administrative convenience on C/LMS usage by educators is explored under the discussion section later in this chapter.

Figure 15 shows the home page of Vula after a successful log-in by any user (lecturer or

student). The workspace on the homepage shows the functional options available to a student after a successful log-in. Starting with the tabs, a student has a working space (my space) as well as links to faculty related information, the current news updates, and the list of linkages to the student's other active sites (my active sites). The panel is linked to the 'my workspace' tab (icon), leading to announcements, calendar, resources (content and links to other materials), personal profile information and an option to further e-literacy skills online (LearnOnline), etc. Whether this view of an e-Classroom and the featured offered is adequate for learners or not is explored under the analysis of the findings of students focus-group interviews later in the chapter. The lecturer's view page on Vula is shown in Figure 16.

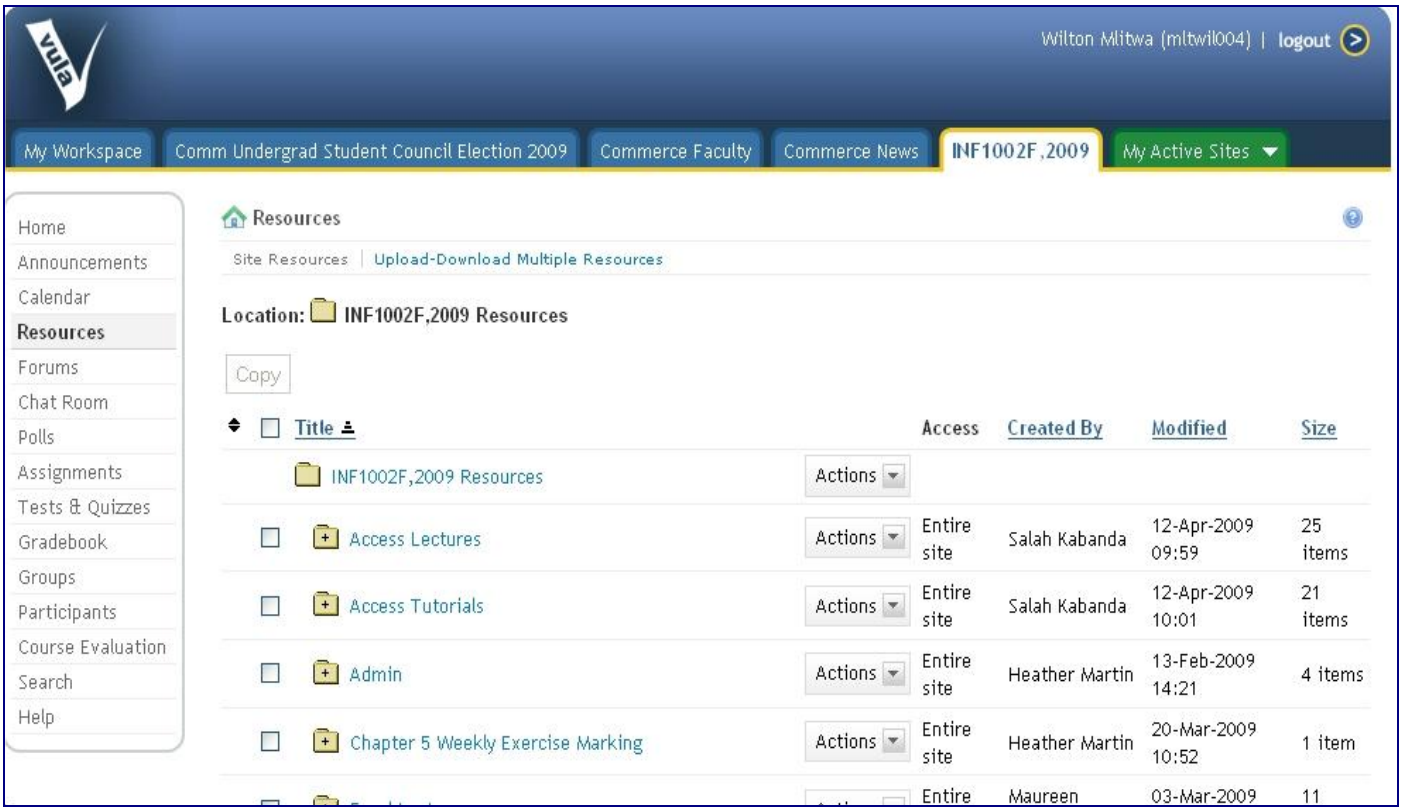

Figure 16: Lecturer's Working Space - "My Active Site" on Vula

Source: https://vula.uct.ac.za/portal/site/c865c2a5-effb-44c9-8cd6-ab5129eb1f8b

In the lecturer's page in Figure 16, a lecturer (or designate official such as a courseware developer) has additional rights to design, mediate learning and related online interactions, add or restrict new participants and to manage assessments (assignments, tests and quizzes). The lecturer further commissions and guides group collaborative projects whose

progress is often discussed through chat-room interactions. The lecturer also has full rights to upload and download resources in any of the courses they offer, or to assign various user rights to his teaching assistants. A lecturer and convenor of the Information Systems INF1002F course, for example, have given various access rights to the course to four lecturer-assistants. This is shown under the resources icon on the given image. Similar to the students' view, a lecturer also has a page showing all the sites to which he/she has access (my active sites), where he/she can then choose any of the options shown under the home page on the panel of Figure 15 and Figure 16. Of note in Figure 16 however, is that interactive communication (chat-rooms & forums) and collaborative (group) facility options are visible on the lecturer's home page as the originating point. By implication, they are instigated by a lecturer for students to see and engage in, which places the use of these options by students, entirely at the discretion of a lecturer who may or may not wish to activate them.

The 'help' icon at the bottom of the panel introduces a point of interaction between the lecturer or student, with the support actors such as e-Learning administrators and the network support team. There are no differences between WebCT (CPUT) and Vula (UCT) in terms of a separation of operational rights between a lecturer and a student. In both system, the rights of a student are more limited than those of a lecturer or a courseware developer.

Functionalities that describe or constitute Vula and its usage are: content repository tools (resources icon); assessment functions (assignments, tests and quizzes, and grade-books); collaborative learning tools (group functions, and forums) as well as the interactive communication facilities (forums, chat-rooms). Adequacy of the available functionalities teaching and learning needs requires insight from the users. This is clarified under the discussion of findings later in this chapter.

5.1.4 The KEWL Next Gen C/LMS at UWC

The University of the Western Cape (UWC) uses the Knowledge Environment for Web-based Learning (KEWL) as its C/LMS. UWC has two separate versions of the KEWL C/LMS. The KEWL 3.0 (known as the e-Teaching platform) is used by lecturers for teaching and course management purposes. KEWL Next Gen (KNG), on the other hand, is accessed and used by students for various learning and communication purposes (UWC, R24; UWC, R39).

Both systems are synchronously linked so that what a lecturer does on the e-Teaching platform (KEWL 3.0) can be accessed by students on KEWL Next Gen. Figure 17 and Figure 18 present the operational outline of e-Teaching/ Learning environments at UWC.

Figure 17: KEWL 3.0 e-Teaching Platform, UWC

Source: http://eteaching.uwc.ac.za

KEWL 3.0 differs from a KEWL NextGen e-Learning platform in that the former presents the teaching aspect of a C/LMS. Lecturers are enrolled by the central e-Learning division into their respective courses. Similar to the previous two C/LMSs at CPUT and UCT, they are granted full rights to design, manage the course and to perform various tasks. As shown in Figure 17, once the lecturer enters the e-Teaching platform, he/she is able to log-in and work in his/her allocated space. Similar to Vula (at UCT), it is clear that parties to an e-Learning platform extend beyond just the educators and learners. Network administrators, who enrol lecturers and help them with their passwords later on, and the e-Learning division that train lecturers and learners on how to use the system, play an important role in the adoption and use of e-Learning. The 'help' icon on the user page, for example, is only helpful if the support team is knowledgeable, willing, available and highly responsive to help requests (Mlitwa & Van Belle, 2010). This point is discussed in detail under the presentation of interview data, and under the discussion of findings later in the chapter.

An example of a lecturer space after logging in to the e-Teaching platform is shown in Figure 18.

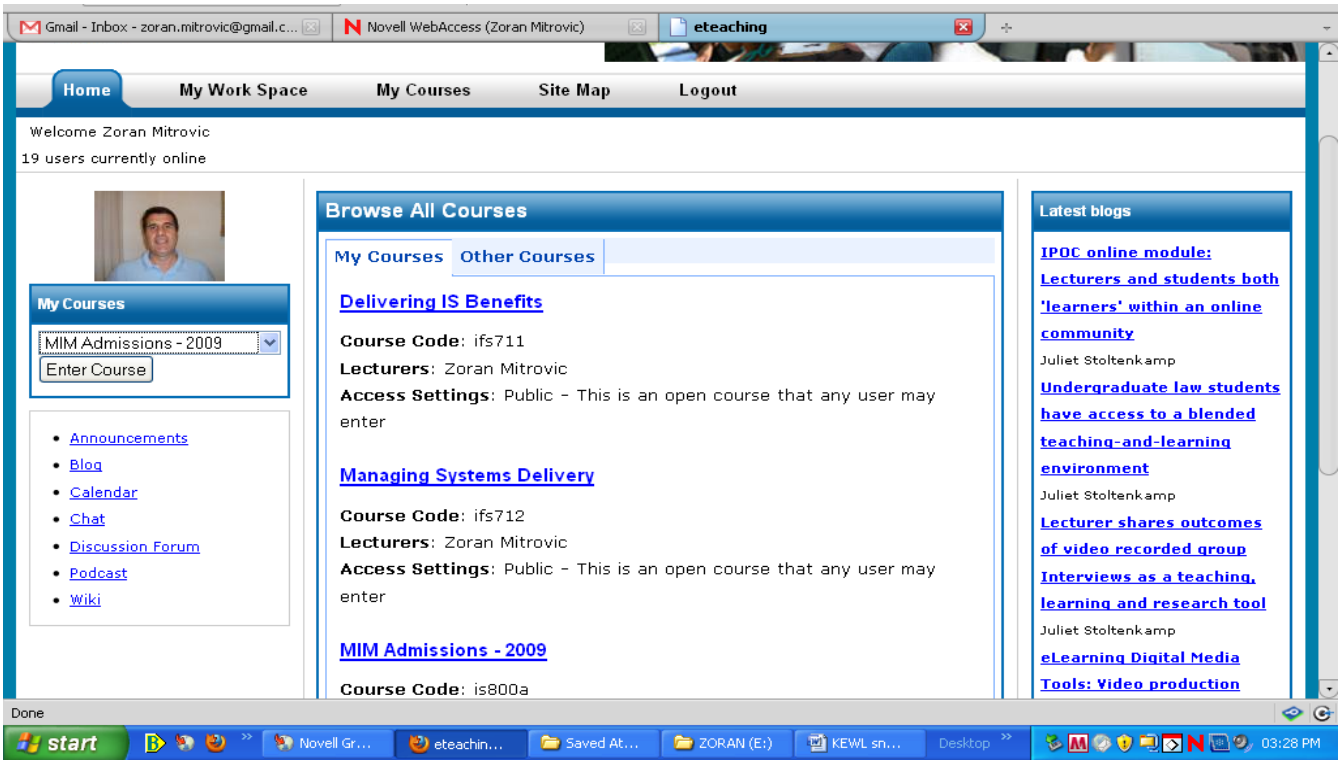

Figure 18: Lecturer Page, KEWL 3.0 e-Teaching Platform, UWC

Source: http://eteaching.uwc.ac.za/index.php?module=postlogin

On the tabs the lecturer may go to his home page, to his work space, to courses, to the site map or simply just logout in the last icon. In Figure 18 the lecturer has opened a 'my courses' section which shows all the courses he is in charge of.

On the panel on the left side of the page, the lecturer may post announcements, initiate and engage in a blog, access the calendar, initiate a chat with students or participate in an existing one, engage in discussion forums, or use a pod-cast and wikis.

Deducing from the nature of the seven functionalities listed on the panel of the lecturer's e-Teaching page, interactive communication is clearly a dominant feature of the KEWL system. Whilst multimedia interactive features can be enabled or disabled in all C/LMS (Vula, KEWL, WebCT, and WebStudies), the presence and enablement of a blog, pod-cast and wiki facilities, for example, places KEWL in par with Vula, but ahead of WebCT in terms of the interactive communication intent.

Questions of relevance and adequacy of the system to the needs of the user (lecturer and student), the extent to which lecturers and students are putting the system into use, and explanations thereof are discussed in detail under the findings. The student view platform on KEWL Next Gen (KNG) (http://elearn.uwc.ac.za) or e-Learning is shown in Figure 19 .

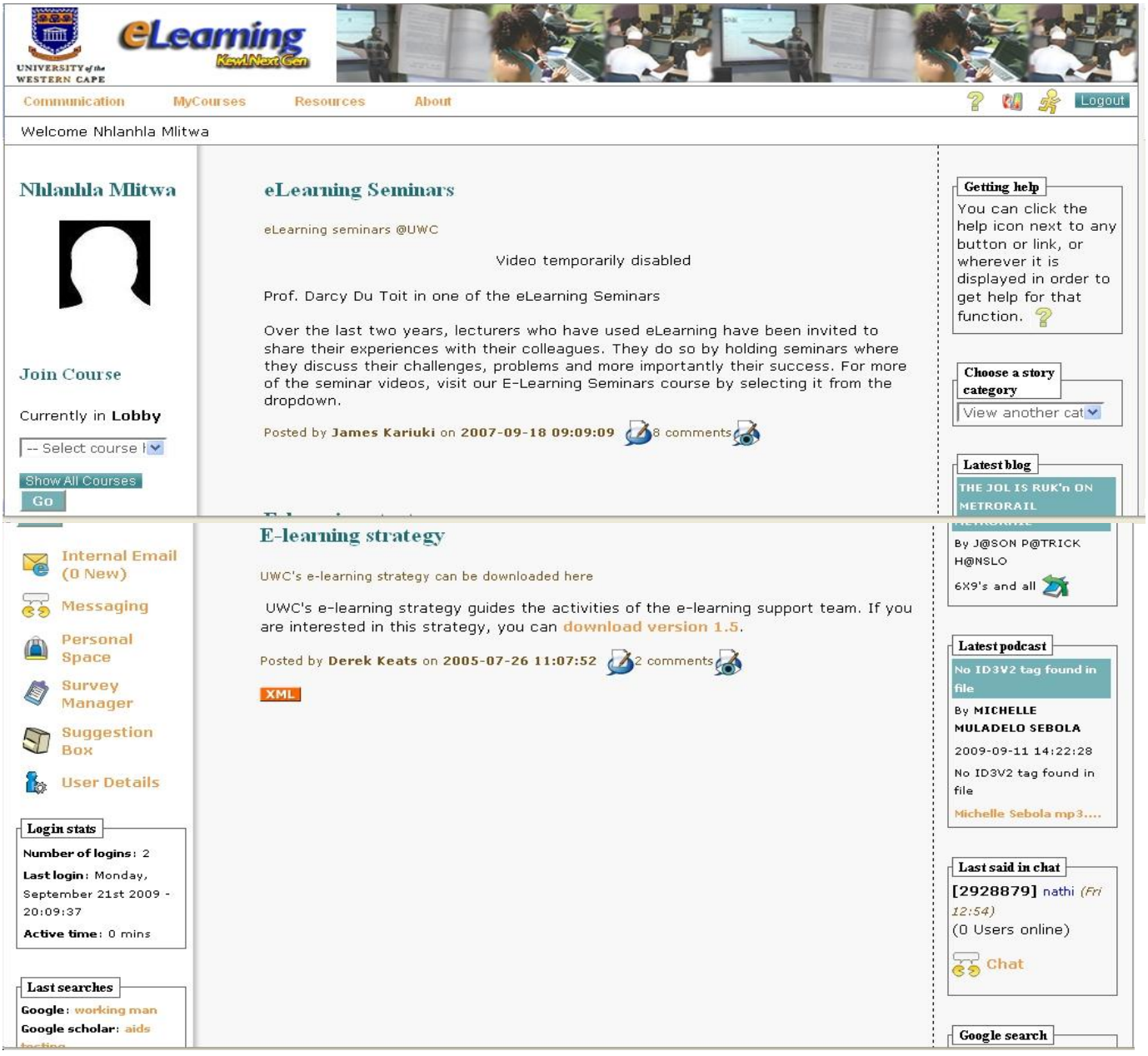

Figure 19: Student Page, KEWL NextGen e-Learning Platform, UWC

Source: http://elearn.uwc.ac.za/index.php?module=_default

On the student view, a student can use the C/LMS to communication, to access different

courses (my courses), to access resources (i.e. course content), and to access additional information and notices. Similar to the Vula system at UCT, the interactive communication facility options such as chat-rooms and discussion forums are activated on the lecturer's home page. The implication is that they can only be initiated by the lecturer for students to engage in. As it is the case in all institutions therefore, it is a lecturer who determines the use of these facilities by students.

The extent to which lecturers initiate and facilitate KEWL usage by learners at UWC is elaborated in the presentation of interview data, and under the discussion of findings later in the chapter.

5.1.5 Web-Studies C/LMS at the University of Stellenbosch (US)

The e-Kampus strategy articulates e-Learning and its implementation at the US (Van der Merwe, 2004). As part of this strategy, the US makes use of the WebCT in its implementation of e-Learning.

Figure 20 shows the first page that is accessed by the lecturer after a successful log-in to Web-Studies at the US.

Figure 20: Lecturer View, Web-Studies C/LMS, Stellenbosch

On the home page in Figure 20, the lecturer can see all the courses (course list) under his/ her responsibility. Upon selecting and accessing a specific course, a lecturer may perform a number of administrative or teaching functions using any of the available tools on the C/LMS. On a selected course (Learning Java) on Figure 21, the course content in the form of notes and reading materials, are presented for access by learners.

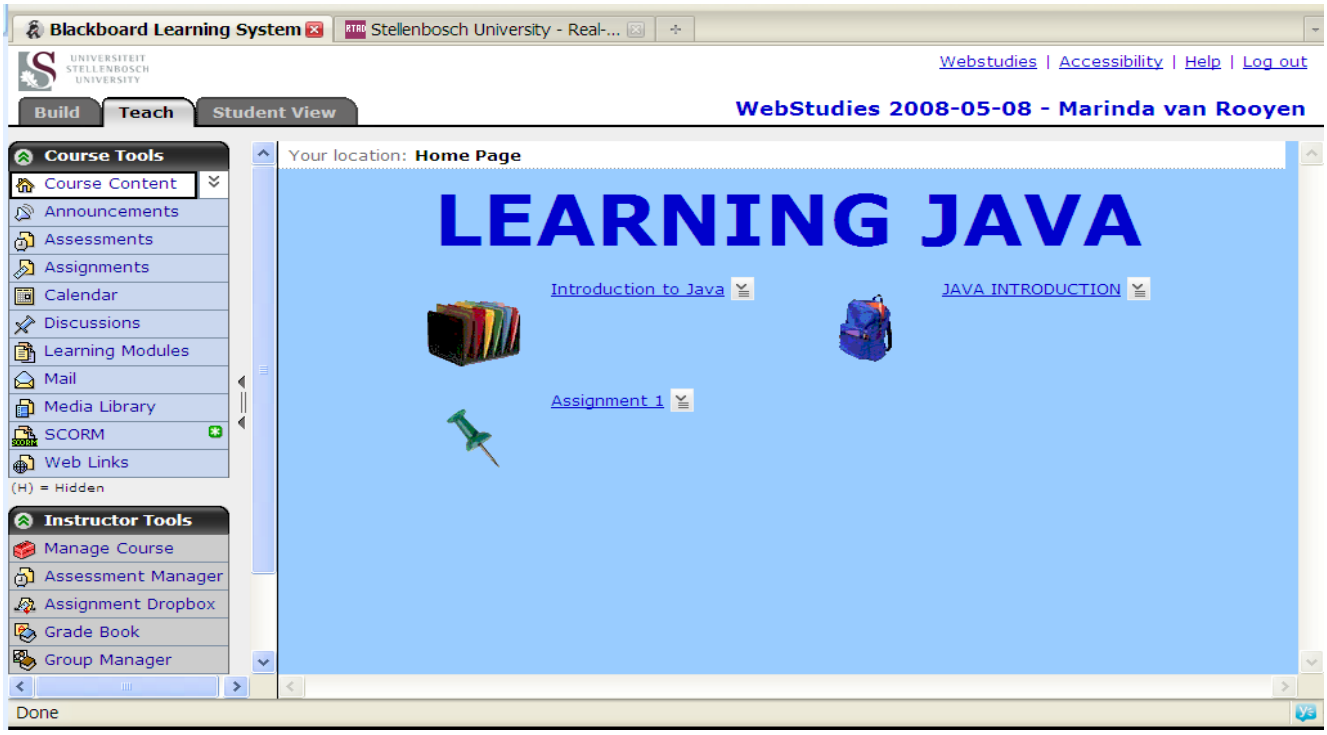

Figure 21: Lecturer Page, WebStudies Platform, Stellenbosch

Source: http://webstudies.sun.ac.za/webct/urw/lc4130011.tp0/cobaltMainFrame.dowebct

Unlike the WebCT system at CPUT, and similar to the Vula system at UCT, as soon as students have enrolled for a degree and its specific courses at the central administration division, they are automatically registered into their courses on the e-Learning platform. There is no need for a lecturer to enrol individual students into individual courses on WebStudies (Van Rooyen, 2009), which means less administrative burden for educators. As shown in Figure 22, lecturers can decide on what can be shown on or hidden from the students view page.

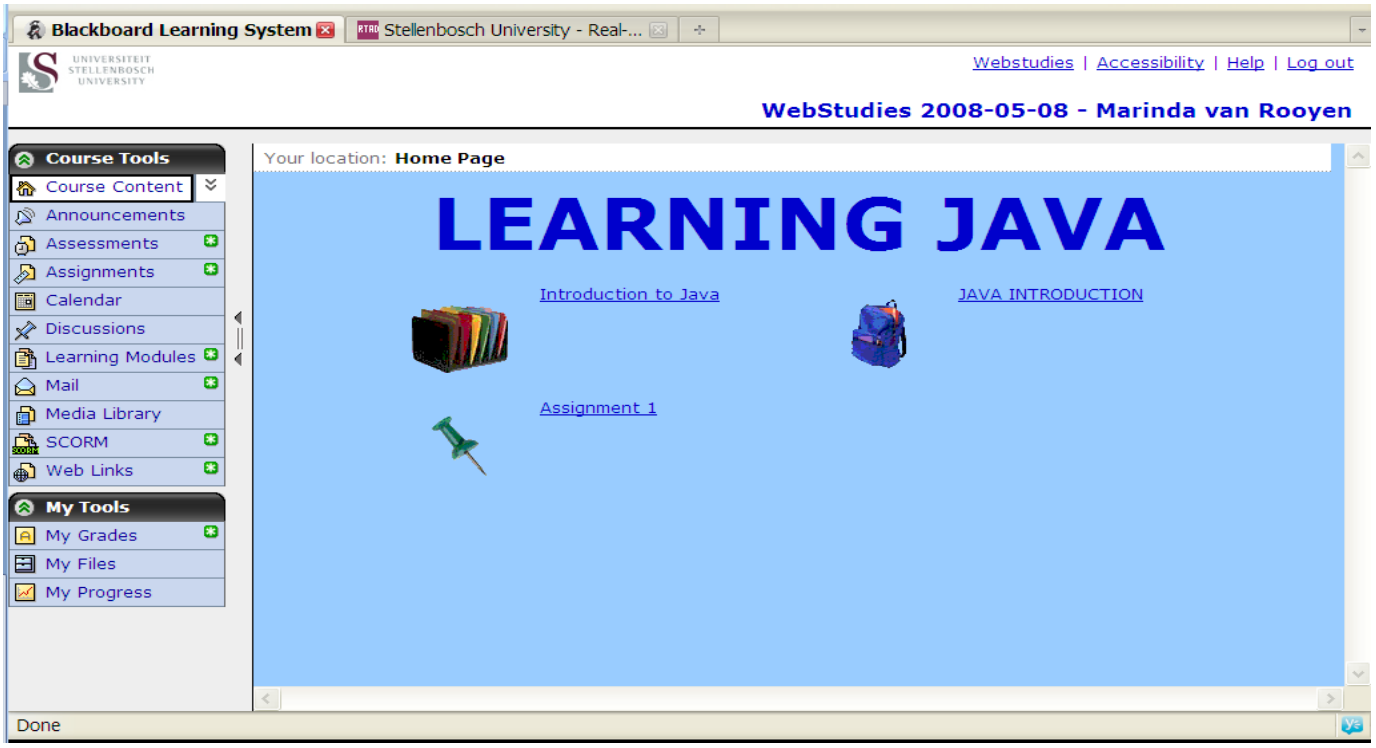

Figure 22: Student Page on Web-Studies, Stellenbosch

Source: http://webstudies.sun.ac.za/webct/urw/lc4130011.tp0/

A student in this case has access to all the courses they are registered on, on Web-Studies. Upon selecting a specific subject, a student may perform any of the tasks according to the rights reflected on Figure 23.

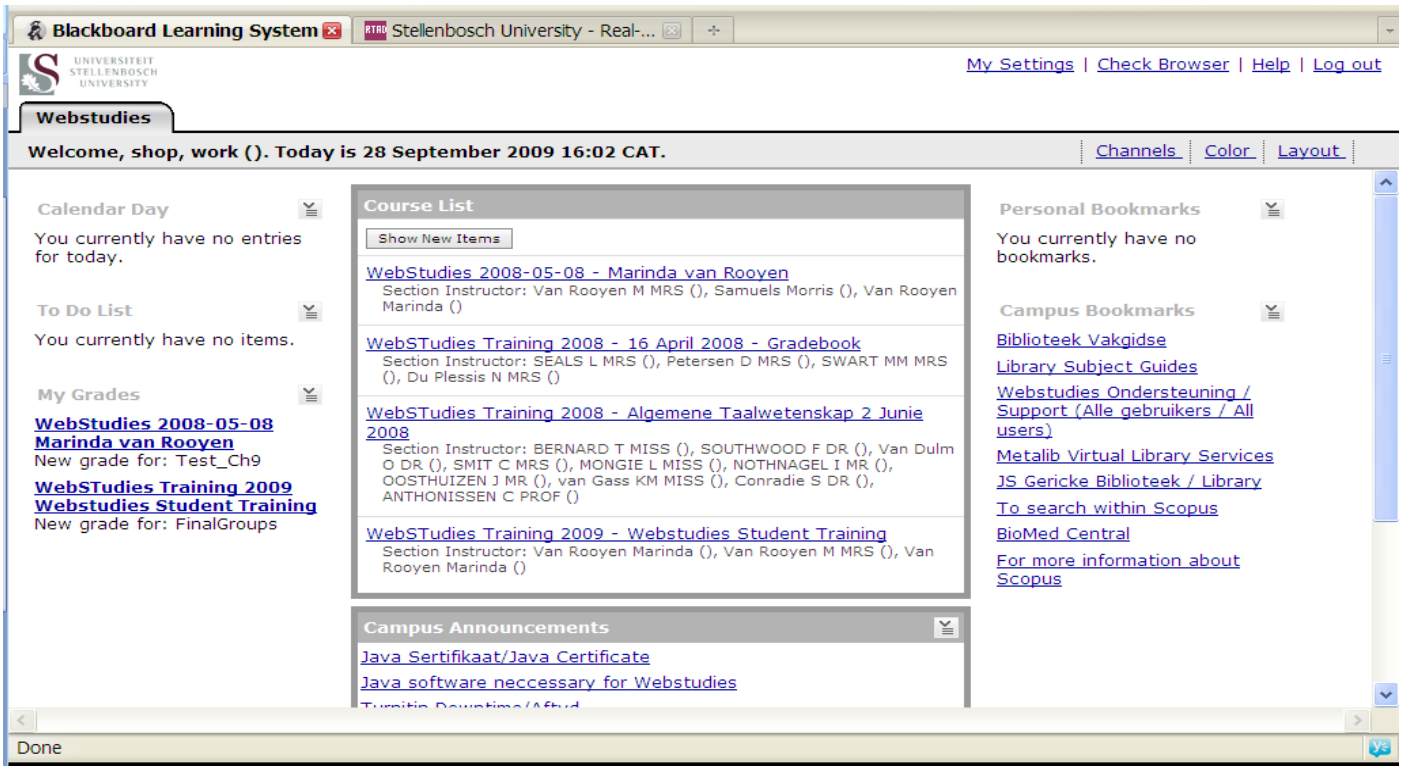

Figure 23: Student View of Module on Web-Studies, Stellenbosch

Source: http://webstudies.sun.ac.za/webct/urw/ic4130011.tp0/

The student space of the Web-Studies C/LMS is similar to that of the lecturer, with the exception of the rights they have on the site. A student, for example, can only access and use what the lecturer has made available, and has activated. If the lecturer chooses not to use a C/LMS, a student is also disempowered from using the systems, and it is for this reason that the lecturer is the main subject of investigation in this thesis.

To introduce the regimes of e-Learning in each institution, the types of C/LMSs and interface of institutional systems were presented in this section. The purposes of use (from the institutional perspectives), the functionalities of each system, as well as the implementing units within each institution were also outlined in this section. This information represents only the institutional perspective (purpose in the ActAD framework) of what educational solutions a C/LMS should offer, how a C/LMS should be used and for what purposes. This information does not account for the usage preferences and experiences of students and lecturers. It offers only the institutional insight (as embedded in CLMS tools and the assignment of user rights) to the research question. Within the context of the e-Learning

ActAD framework (Figure 9) used in this thesis, the significance of the description is that it accounts for the objective of the institutional actor on the work-activity system. The rest of the actors, their objectives, goals and activities – are discussed under the findings in sections 5.2 and 5.3.

5.1.6 Conclusion of Institutional C/LMS Regimes

The main objective of C/LMS adoption by universities is to support teaching and learning by supplementing (rather than by replacing) existing formats of teaching and learning in the case of CPUT (Smit, 2010). The concept of 'support' appears frequently across institutional statements of intent, with UCT also declaring the goal of its Vula C/LMS as being to support teaching, learning and educational collaborations within the institution (Vula, Online). UWC's statement declares a mere facilitation (which is closely related to the term 'support') of teaching and learning through the use of a C/LMS. An assumption is made in this thesis that teaching and the facilitation of learning are priority aspects of a lecturer's job-description. In this respect, the term 'support' assumes non-obligatory but discretionary connotations for a lecturer – on whether to use a C/LMS or not, and in choosing the method that best 'supports' his/her own academic goals and pedagogical assumptions.

In a stricter sense, the University of Stellenbosch declares the intention to 'maximise' the use of its C/LMS, so as to enhance the quality of teaching and learning (van Rooyen, 2010). The goal to 'maximise' usage and to 'enhance quality' of teaching and learning assumes that a C/LMS adds value to teaching, learning and other academic processes. From this assumption, it can be expected that a C/LMS will be used to pursue educational enhancements. These points are interrogated further under the lecturers' interview inputs in section 5.3 later in this chapter.

In closing, this section shows that institutional objectives on C/LMS usage are operationally interpreted into feature designs, and the allocation of users' rights. The users, in turn, have to fit into what is offered by the institution. The aim of this study is to understand the factors that encourage or inhibit C/LMS usage by lecturers, and the extent to which the C/LMS regime structure affects usage or non-usage is interrogated further under the lecturer interview findings. Understanding C/LMS usage patterns in academic programmes, from the perspective of the user therefore, is important. Whilst the focus of the study is on the factors affecting system usage by lecturers, students' experiences (and preferences) are presented

ahead of lecturers' findings, as background information in section 5.2.

5.2 Student Perspectives on C/LMS Usage

In the ActAD framework, e-Learning is described as goal-determined collective activities by various stakeholders in the activity system, working towards a common goal (Figure 9). Work activities are carried out by different actors, who are the institution, the educators, learners and the support individuals within the e-Learning and IT network units. The institution is presented as the first actor in section 5.1. However, students can be considered to be the most important actors in the ActAD framework (Figure 9) because they are the intended beneficiaries of e-Learning activities. Whilst the focus of the study is on the factors of adoption and usage of C/LMS by educators, insight from students' experiences and preferences is outlined in this section, as inferential background to the interrogation of the lecturers' circumstances later in the chapter.

Drawing on the ActAD framework, the experiences of learners are dependent on whether and how lecturers use a C/LMS in teaching and learning. Both lecturers' uses of a C/LMS and the resultant experiences of students are dependent on the mediating factors (independent variables): the social, technical and environmental factors identified in Figure 9. The mediating factors are used to present students' experiences in this section.

5.2.1 Students, C/LMSs and the Learning Activities

Data in this section was obtained from students' focus group interviews across three different universities in the Western Cape region.

5.2.1.1 About the focus Groups

Two focus group meetings were held in two CPUT campuses. At the Cape Town campus seven participants were selected. To get a perspective of a new student in a university, one first year student was included in the group. Further, two fourth year, but part-time, students and four fourth year full-time students were included in the group. In the second interview, held at the Bellville campus, five (out of the nine selected sample) were interviewed. Two of them were females, three were part-time students with full-time employment in the government and the financial sector, whilst the two were full-time students, with one being on the in-service training at one major financial institution.

One focus group interview was held at UWC. Nine respondents made up of three first year, two second year, one third year, one fourth year students. Six of the participants were female, and the final two students did not specify their year of study.

In the final focus group interview at UCT, nine participants were selected from across the faculties of commerce, humanities, law and science. Elaborated details on sample selection are outlined under the methodology section and in Table 17, under Appendix 1 at the end of this thesis. Data analysis of students' interview transcripts is approached and analysed using the following ActAD themes:

- Social Mediators,
- Technical Mediators, and
- Environmental Mediators.

5.2.2 Social, Technical & Environmental Mediators of C/LMS Usage

To consider the social mediators, students were asked perceptual [1] and motivational [2] questions on the application of C/LMSs in their registered courses. They were also asked to make usage recommendations [3].

Participants were asked [1]: (i) to reflect on their understanding of learning management systems, (ii) what they understand the purpose of a C/LMS to be, (iii) to indicate whether it is a useful option for the purposes they have just described, (iv) to indicate whether they are using a C/LMS for educational purposes (they have outlined); (v) to indicate whether it is easy to use, and if it is not easy, to (vi) explain reasons for hardships.

Students were asked [2]: (i) whether they get adequate training to use a C/LMS, (ii) whether they get timely responses when facing technical failures, (iii) whether their educators are using C/LMSs in their courses, (iv) their preferences of usage by educators (v) usage omissions, (vi) usage limitations or poor techniques, (vii) how usage omission and poor techniques affect students' usage of the system, (ix) their favourite best uses, and to indicate (x) how best uses have encouraged them as students to use a C/LMS. Students were also asked to recommend [3] enablers in terms of how the C/LMSs should be used to enhance learning within their curricula. Findings are presented first in a summary format in Table 11, and are then elaborated in sections that follow.

Table 11: Student Perspectives on e-Learning in Western Cape Universities

Mediators	Student Preferences	Students Experiences		Institutional similarities/Differences	Implications on usage	Recommendations by Students
	Perceptions on: Meaning of e-Learning, usefulness, use in all courses, usability, adequacy of technical support	**Experiences in:** usability, technical environment, willingness of lecturers, and actual usage in courses.	**Explanations**			
Meaning of e-Learning	Generally seen as the use of a C/LMS by educators to offer content, assessments, feedback on tests, learning and for flexible communication. The term "C/LMS" is often used to describe e-Learning.	Lecturers use a C/LMS discretionary, only for their own convenience.	Students feel that most lecturers do not understand e-Learning & the C/LMS tool. They are not trained on this.	**Preferences** apply to all institutions (CPUT, UCT and UWC). **Negative experiences** were raised only by CPUT & UWC students.	CPUT and UWC students are less satisfied with C/LMS usage by lecturers, than is the case at UCT.	Lecturers should be trained. They must also be forced to use a C/LMS in their courses. As beneficiaries, students must also be heard.
Perceived Usefulness	When correctly used, C/LMS considered useful for flexible access to content and to notices. Also a convenience for virtual submission of tasks, and to access marks.	Usage inconsistency among lecturers limits C/LMS usefulness. It makes it harder for students to follow different styles.	Lecturers seem unsure about procedures. They are untrained, and they possibly find e-Learning to be burdensome	**Preferences** apply to all institutions (CPUT, UCT and UWC). **Negative experiences** were only cited at CPUT. UCT students are satisfied.	Perceptions on usefulness are negated by lecturer usage limitations.	Lecturers should be trained, and then compelled to use a C/LMS correctly and consistently.
Willingness of Lecturers	Students prefer usage of a C/LMS by all lecturers, consistently, and in all courses. Lecturers should be fluent with the functionalities of a C/LMS. There should be more of a C/LMS, and less of traditional classrooms.	Lecturers do not always use a C/LMS. When they do, they often ignore existing functionalities & create their own, that are often confusing.	Lecturers possibly find e-Learning to be burdensome. They don't seem willing.	**Preferences** apply to all institutions (CPUT, UCT and UWC). **Negative experiences** were only cited at CPUT. Usage is adequate at UCT. UWC students are satisfied with limited occasional usage.	CPUT students feel inhibited by lecturer practices. For UWC students what the lecturer say or do, is adequate. UCT students are making frequent use of Vula.	Lecturers should be trained, and then compelled to use a C/LMS correctly and consistently.
Usability	Should be easy to use (In terms of minimalist design and the lecturer style/ approach of usage). Should always be functional.	Vula is easy to use. Whilst WebCT appears easy, technical failures make it impossible to use	Vula is well managed and supported. Network infrastructure is very limited at CPUT.	Technical challenges limit usability at CPUT. Literacy limitations hinder usage at UWC. UCT students are satisfied with Vula usage	Usage remains limited at CPUT and UWC. C/LMS usage remains high at UCT.	Servicing and fixing programmes in time, is recommended by UWC and CPUT students.
Social and Technical Environment	C/LMS must be accessible anywhere (on and off campus), anytime. Students want accessible line of communication between then and e-Learning division & network support structures. Help desk must be responsive, 24hrs, 7 days a week.	Vula is accessible everywhere. KEWL and WebCT are often hard to access outside campus. WebCT is always down even within campus, and the help desk is not very responsive. UWC students have to wait in long queues, competing with MS word users for a 20 minute slot to use a computer in overcrowded labs	Technical infrastructure is limited at CPUT, and the helpdesk is not responsive. At UCT, Vula is well managed and supported. At UWC lack of facilities off campus is a problem	CPUT students are literate, but are let down by poor facilities, and helpdesk inefficiency. UWC students complain of limited training, helpdesk in efficiency. At UCT, science and humanities students complain of access limitations after hrs	Usage is hindered by poor infrastructure and bad helpdesk support at CPUT. Science and Humanities students overcrowd commerce labs after hors and on weekends	The helpdesk should open for 24hrs a day, and password solutions should be available in all labs at CPUT. At UCT, open science and humanities labs for 24hrs (just like the commerce lab). 20 minutes is too short, and UWC students want a lab to be dedicated to KEWL usage.

Findings in Table 11 are elaborated (with references) in the following sections.

5.2.2.1 Perceptual Factors: How Students Understand a C/LMS

Understanding of perceptions begins with meanings that students attach to the phenomenon of e-Learning, and a C/LMS. Because of a tendency by institutional units to label C/LMS portals as 'e-Learning' sections on institutional Websites, students tend not to distinguish between the term 'e-Learning' and its associated C/LMS tools. In the three universities, the terms of e-Learning and C/LMS are used interchangeably, as if they are one and the same thing. Asked to elaborate, most students tend to refer to e-Learning either as a process (a way of doing educational things that include access of structured content, conducting assessments, checking of marks, getting important notices about the course, and to learn) or a resource and tool used to do educational things, electronically. All references to a C/LMS tend to prioritise learning.

5.2.2.1.1 A Process and Resource to Do Educational Things, Electronically

In describing e-Learning, students just talk about a 'system' or refer to a C/LMS by its name, such as 'WebCT' (CPUT), Vula (UCT) and KEWL Next Gen (UWC). Asked to describe e-Learning, for example, a CPUT student added a learning aspect to this teaching aid, saying '*I think e-Learning is somehow a way of* **learning** *electronically*' (CPUT, BR8). In this case it is seen as a process of learning over an electronic environment. Whilst learning seems central to this process, others see e-Learning as a process of extending resources (of a physical classroom) into an electronic environment. A student at UCT, for example, felt that e-Learning is like when '*they* [lecturers] *take what is given in* ***lectures*** *and they make it available electronically*' (UCT, R10). A combination of 'learning', 'lectures' and 'electrically' clearly reveals a picture of 'an 'electronic classroom' in the minds of students.

A student at CPUT describes e-Learning as a way of '*getting* ***learning sources***' (CPUT, C-R28). Other students clearly believe that e-Learning means a C/LMS. Asked to describe her experience with e-Learning, for example, a student at UWC went on to say: '*We just use it more like a data base, we can download all the documents the lecturer provided us*' (UWC, R24), responding as if she was talking about a C/LMS. Reference to 'it' when talking about e-Learning suggests that e-Learning is not only a process but also a thing, which in a

student's mind, refers to a C/LMS. Appraising the independence that having notes on a C/LMS gives to a student, a student said '*if it is on e-learning you can go on your own*' (UWC, R39) to access it. In this statement, e-Learning is used to describe a C/LMS which is in turn presented as a storage platform where you can access notes in your own time, pace and space. Whether learners are confusing the two terms, their responses were clear enough to convey their assumptions about a C/LMS in education. Another student describes e-learning as '*a way of communication between the lecturers and the students*' (CPUT, BR9) over a C/LMS. Some students, however, do not have a clear understanding of e-Learning – because they have never had an experience with it in their courses or heard of its tools at UWC (R139).

In an attempt to describe the e-Learning tool called WebCT, a UCT student refers to a number of functions that, in her opinion, describe a C/LMS – to show how WebCT, like Vula, is a C/LMS: '*It's what they used before Vula came out, where you would log on with your student details and you would find links to your different courses… it's very similar to Vula, but just a lot more inefficient*' (UCT, R139). What emerges in this statement is that UCT had used a different system (WebCT) before their current Vula C/LMS, and the current cohort of students have a comparative experience with the two systems. The now defunct system, which is still used at CPUT and Stellenbosch, is described as '*a lot more inefficient*' when compared to Vula.

A C/LMS is seen not only to be a learning tool, but also a means to achieve other necessary functions. The first description, for example, points more towards an electronic resource than a platform for the actual learning. In the second description, a C/LMS is seen as a way of facilitating communication. It is also described as '*an electronic system that should help the instructor with whatever course he is teaching or lecturing*' (CPUT, CR18). This process (teaching over a C/LMS) is described as e-Teaching in Figure 17 and Figure 18 under the UWC KEWL system. Such distinction (between e-Teaching and e-Learning) is not explicit in the presentation of e-Learning systems in other universities. It is implicitly marked only by differences in user rights between a student and an educator.

In summary, e-Learning can collectively be described as a process to learn electronically (over a C/LMS), to source educational resources, to facilitate communication between educators and learners, and to help instructors carry out (manage) various teaching tasks,

electronically (or over a C/LMS). The mention of the electronic space – 'electronically' – introduces an aspect of the 'context', the 'environment' and the 'means' of practising in this process. A C/LMS is understood as an electronic medium to carry these processes through. As a learning platform, a C/LMS is important for learners. The magnitude of significance is elaborated further in the following passages.

5.2.2.2 The Usefulness of a C/LMS

This section discusses the significance that students attach to C/LMSs in the four institutions. It sums up how students across the institutions understand the functions of a C/LMS. These perceptions are then used to articulate the students' perspective on C/LMS usefulness.

5.2.2.2.1 System capabilities and fitness for purpose define usefulness

A C/LMS is not only an electronic resource and tool, but a desirable means of achieving useful efficiencies in educational contexts. In the words of a CPUT (C-R23) student, you just have to go to a computer '*that has Internet access, anywhere in the world*' and learning '*is just easier*' (CPUT, C-R23), flexible and convenient in the sense that, through the use of a networked C/LMS, learning '*could be done from your house, work, from anywhere*', adds another CPUT(C-R24) student. WebCT for CPUT (Bellville campus) students helps in getting '*your marks*' and '*your notes*' without having to physically go to the traditional storage facilities on campus such as the central 'F-drive' (CPUT, BR10; BR11).

A C/LMS also simplifies storage and retrieval of resources and key information. It also enhances communication processes in many ways. Overall, Vula '*just makes things so much simpler and more efficient*' (UCT, R127), especially when '*studying for exams*' (UCT – R150). UCT students also find the chat-room facility very useful '*because people actually e-mail problems that they have and during the day you get different lecturers logging onto the chat-room… and they always answer, and even if I wasn't asking any questions I get more learning… as I read what other people are saying and what the response is. So, I like that as well about Vula*' (UCT – R182). One way in which a C/LMS improves convenience in the traditional contact classrooms is that it gives '*… comfort of knowing that I could actually just listen instead of just writing notes down the whole time cause you can just go back and get them later*' (UCT, R67).

A C/LMS, therefore, further enables the same activities to be done more easily and more quickly. Instead of waiting for lecturers to give you your marks, for example, you can simply log-in to WebCT and get your marks at the press of the button (CPUT, BR14). Whilst it is considered useful, students believe the role and objective of a lecturer determines whether and how a C/LMS is used, and whether learners can benefit from its capabilities (UCT, R75). Clearly, all statements seem to conditionally link the usefulness to initiatives made by a lecturer. In the case of a chat-room, students say it works well if the lecturer also plays an active part. In other words, a C/LMS is useful as a facilitating supplement rather than a replacement of a traditional classroom. For example, students say it can help them do more listening as there is less note-taking in lectures.

Confidence in how the concept of a C/LMS simplifies learning and access to learning processes suggests a belief in its usefulness among students; that is, if it is technically sound and effectively implemented. Technical in/adequacy of C/LMSs, therefore, informs the level of its usefulness for learners. Students' experiences on this aspect are presented in the following section.

5.2.2.3 Student Perspectives on the Technical Adequacy of C/LMSs

Experiences of students regarding technical in/adequacy of a C/LMS in terms of consistent functionality, reliable accessibility on and off campus, as well as the availability of technical support at the Universities in the Western Cape are presented in this section.

5.2.2.3.1 Access Reliability and Functional Consistency

Students in different institutions report varying experiences with technical factors to CLMS usage. Experiences range from technical inadequacy and limited usage, on the one hand, to efficient functionality and a high rate of usage on the other.

At CPUT (Cape Town Campus) technical failures often render a C/LMS entirely inaccessible. Asked to elaborate a student said, '*You should be able to access it. It should be easily accessible from anywhere but… it's not always the case though*' (CPUT, C-R26; R27), '*it's forever down*' (CPUT, C-R52; R105). At UCT, on the other hand, '*technically, the system is functioning satisfactorily, like in any other place; however, there are those rare occasions where the network or servers will be down*' (UCT, R275).

The software used in the system also places extra burden on the user, who requires the costly type of connectivity to access the system off-campus. Students at CPUT and UWC reported '*lots of problems when logging on from home*' (CPUT, C-R101). '*Actually*', adds a visibly frustrated student, '… *to log into WebCT from outside is a nightmare*' (CPUT, C-R104). Access is a big problem for BTech IT students, as more than half of the PCs in the lab are broken (CPUT, C-R398). For example: '*You don't want to wait thirty minutes for your assignment to upload and wait another thirty minutes so that it can go through*,' says a CPUT (C-R400) student. At UWC a student also reports: '*You have to be on campus if you want to use it*' (UWC, R156). The problem at CPUT is that '*it is not current at all*' (CPUT, C-R106) '*or server is down – Monday, Tuesday, Wednesday, Thursday, the whole week*' (CPUT, C-R107; R108). The problem is independent of the time of day, as even at 23h00 on Sunday evenings or at 07h00 it is hard to access the system, which excludes the possibility of network congestion as the cause (CPUT, C-R113; R114). Whilst a lack of '*back-up systems to support e-Learning*' is one of the limitations at UWC (R160), at UCT physical access is unevenly distributed between faculties. The commerce lab stays open 24 hours a day, but since other faculty labs, such as humanities, close at certain times, other students congest commerce labs, making it difficult for commerce students to use the facilities (UCT, R209).

Attitudes of lab personnel are also a problem for science students at UCT (UCT, R194). Often '*the printer is not working the whole week, you see… and then sometimes you have a problem with your password and then if you go and ask them what it is…'* (UCT, R196) '… *they never know*' (UCT, R197). Things are just not user friendly (UCT, R198). It also seems that the science lab does not have the same kind of programs as the rest of the university. They use other systems and internal websites (UCT, R199). Instead of students congesting labs in a few that are open in other faculties, related faculties should acknowledge the needs and open their labs for longer hours as well (UCT, R234; R235). All labs should have the same standards and should open for longer hours to accommodate the needs of their students. The use of Vula in the Science faculty, and not any other system or internal website, is then recommended (UCT, R236). With the exception of Science students however, students describe the helpdesk as free, efficient and perfect at UCT (R204; R205).

Lack of access to one's own computer and the Internet is a major disincentive for most of

UWC students (UWC, R18). Technical failures make it very hard to use the system, even within the campus at UWC (UWC, R73). External factors, such as national network infrastructure and a lack of facilities for individual students, are cited as reasons for access problems outside campus. On this point students with an ADSL network experience fewer access difficulties outside campus than those without (CPUT, C-R116; UWC, R104).

CPUT students do not find the helpdesk useful. When experiencing log-in difficulties or password problems, they have to leave their work station (computer lab) and physically walk to the admin buildings with their identification details to seek help. After hours or during weekends there is nowhere to go. CPUT students are calling for e-mail or phone-in facilities to help them at times of technical difficulties (CPUT, C-R182; C-R183; C-R186). Using facilities that require extra and costly software to access what lecturers have uploaded on the e-Learning platform also seems to inhibit access. On this point a UWC (R104) student reports a problem with a system requiring a download of a web-player or a need to install something particular in order to complete a specific task given by the lecturer on KEWL.

The general feeling is that it is great to have a C/LMS with impressive facilities, but not useful if the system is technically not easy to use. In their e-Learning endeavours, lecturers always need to think of supporting, and not technically or financially burdening, the student.

5.2.2.4 Usability (Ease of Use) of a C/LMS

Vula at UCT is very easy to use (UCT, R45; R56; R57). It is '*not particularly difficult to navigate*' (UCT, R50). It is also integrated with the central student e-mail system, so that whenever something is uploaded on Vula an automatic notification is sent to students' e-mails. Further, reasonable effort is made by the institution to popularise Vula among students. Students actually think there is no way you would not know about Vula, as lecturers are always talking about it (UCT, R41).

At CPUT registration and enrolment into the system is described as lengthy, complex and confusing, as procedures are unknown to learners. With unclear procedures, one cannot even begin to access and use the system. CPUT students are calling for the coordination of a C/LMS with administrative processes, and that it should be linked with the rest of the student enrolment administration processes (C-R91; C-R98). Students argue, however, that WebCT is not badly designed, but poor implementation practices by implementers and

lecturers complicate usability at CPUT (CPUT, C-R195). Students believe that what they need from the system is already available, but lecturers either use it incorrectly or they completely ignore the existing facilities due to ignorance or perhaps just pure laziness (CPUT, C-R196; C-R391).

5.2.2.5 Appropriate Use of C/LMSs by Lecturers

Sampled students tend to share similar perspectives on what the appropriate uses of C/LMSs are and should be, with varying experiences on how these systems are used by their lecturers.

Whilst students prefer C/LMS in all their courses (UCT, R135; CPUT, BR46; BR54; UWC, R87; R123; R125), they believe that appropriateness of use depends on the objective of the lecturer, and the relevance of the system to an academic programme. On this aspect CPUT students feel that the system is used '… *more for the convenience of the lecturers*' (CPUT, C-R139) who seem to use it reluctantly and without thinking; perhaps, just to satisfy their bosses that they have used it (CPUT, C-R140; R146). CPUT students also complain that they are never orientated or even told how the system works. Asked how they started to use WebCT, for example, students unanimously declared, '*We were never told… how to use it*' (CPUT, BR30; BR31), '*we never got any training on how to use it*' (CPUT, BR32), and teachers use it only when they feel like it (CPUT, BR53). Asked to clarify if a C/LMS is useful, a student said, '*They do not use it as much as they should be using it because, for instance, some functions are just sitting there, like the results function. I've never seen my marks on WebCT but there's that function on WebCT*' (CPUT, BR102). Lecturers' inconsistency reduces trust that students should have in a C/LMS, such that they end up loosing confidence in the system (CPUT, BR55). Poor C/LMS-usage by lecturers discourages further usage of the system by learners (CPUT, BR86 –BR93).

On this point UWC students argue against a purposeless and religious-type of usage, but advocate a purpose-driven type of usage, and only when there is a need (UWC, R62; R63). Similarly, a student at UCT argues that it is '*a matter of – if it is applicable*' and is '*practically possible… because architecture lecture-notes cannot be understood without a lot of direct explanation by the lecturer, so there is no point in putting up things without him being there to explain how to get to that diagram*' (UCT, R91). The thinking in this case is limited to the experience of receiving unexplained notes, hence they doubt if a C/LMS would be

appropriate in technically challenging courses that require extensive demonstrations and explanations. This is a point of pedagogical consideration for educational technologist and instruction designers.

In many cases, however, the appropriateness of C/LMS usage is dependent on the ability and skill of the course administrator to use a system, '… *so I think it's a two way street. There's ability while there's capability for it to be used efficiently*' (UCT, R130), argues a UCT student. On this point, commerce students at UCT were bragging about how some lecturers make it easy for them to work with Vula, saying that lecturers even tell you (the student) exactly what to look for and where to find it (UCT, R134). Instances of resistance to change were also raised as inhibitors to C/LMS usage among lecturers. The verdict on this point is that lecturers should be compelled by policy to use a C/LMS (UCT, R248; R249; UWC, R184).

5.2.2.6 Recommendations by Students

Uploading of academic content such as notes, learning materials and academic notices is the most important function of a C/LMS in all sampled institutions. UWC students, for example, describe the efficient use of a C/LMS as when all the relevant content, lecturer slides, notes, and everything else dealt with and spoken about in class is uploaded KEWL (UWC, R63). This perception is informed by current practices at UWC. Perhaps if lecturers were able to use the system for additional purposes, students might consider those functions as equally useful as well.

Further, the synchronous interactive component is cited as a priority 'wish-list item' for UWC and UCT students. The argument is that, when used purely to access notes, then a C/LMS is not really a representation of e-Learning (UWC, R31). It could be used as a '*forum for discussion on a specific topic*' (UWC, R28). It should also be interactive '*like an e-tutor*' (UWC, R36; R37). We '*want it to come alive*' (UWC, R94), '*it must be like a person*' (UWC, R96), declare these two UWC students. They are calling for the educator to be present, both in lecturers and on the e-Learning platform to respond to them when they have questions. At least, '*like mixit, if you are on mixit you can ask the questions on tradepost, and tradepost will answer you back, even if it is not immediately*' (UWC, R190). On a more realistic not however, students are also willing to settle for belated (non-synchronous) responses to this proposed e-tutorship system. This introduces an almost unrealistic demand on the lecturers

to be accessible to students for 24 hours a day. Given a high ratio of students (one lecturer estimated 1500 students in one of the first year Economics classes in one of the institutions) per lecturer in South African universities (UCT, A1-R5), setting up tutorial time slots for groups (rather individual) of students over a virtual group communication medium may address the intricacies of physical space limitations in the long term.

Before talking of appropriate uses of a C/LMS, according to UWC students, lecturers must first and foremost be making an attempt to use it. Whether a lecturer uses a C/LMS or not determines it all (UWC, R172). Given the limited usage of KEWL at UWC, students do not find it to be much useful (UWC-R51; R52; R54). When used, it is often a pointless exercise with lecturers duplicating the text book in point-form. This approach accordingly does not add value because students also have access to prescribed text books they would rather use (UWC –R59; R130). UCT students also complain of inconsistent styles of C/LMS usage by lecturers. Computer Science is the least organised. For example, '*if there is about four courses that you need to go look, everything is so different... it is structured the way they put things but it tends to differ*' (UCT –R45; R46), to see '*my grades on my Ecos I know there's Grade Book, they are all going to appear. But in Comp Sci there isn't that. So if I wanted to see my, my, well, I know they are all different, so I have to adjust with every course*', explains a UCT (R48) student.

There is also a plea by UWC students – that the KEWL e-Learning system be integrated with other knowledge data base systems found in the library to reduce library queues (UWC, R61). It must also be integrated with the current tutor system so that tutors are available on KEWL whenever needed by students. Students are asking lecturers to be consistent in their use of a C/LMS. They should all use it and also have some kind of a uniform, predictable system of usage (UWC, R109). Further, students suggest that lecturers who try to, and really want to, use the C/LMS should make an effort to learn to use it properly so that their efforts may help and not confuse the student (UWC-R113; R117; R118).

In support of a single system in an institution, UCT students emphasise accessing courses in one central system (as opposed to multiple systems) as valuable and convenient (UCT – R24). Otherwise, despite the inconvenience to students, it would not be financially sound for the institution to pay for two costly systems to do the same function.

5.2.3 Summary on Student Perspectives

Since learners (and learning) are central to the concept of e-Learning, investigations into the use or non-use of C/LMS by educators should be built on the insight of the intended beneficiaries. Therefore, students' perspectives are used as a foundation for understanding e-Learning practices and C/LMS usage patterns by lecturers.

In the focus group interviews students described their understanding of e-Learning and the related C/LMS tool. They also gave their perspectives on the purposes and value of applying a C/LMS in educational processes generally, including teaching and learning. They expressed their expectations and their experiences with current uses of a C/LMS in their courses.

5.2.3.1 Student Conceptions of a C/LMS

Drawing on the goal/motive terminology of the ActAD framework (Figure 9), findings reveal a close alignment of a C/LMS tool of e-Learning with the purposes for which it is used. Perceptually, all participating students believe that a C/LMS is useful, with CPUT and UCT students arguing that it should be used in all university courses. On this point UWC students recommend that a C/LMS should be used only if the course warrants the use, and if the use is appropriate. UWC students believe that the decision on what is appropriate should be left entirely to the lecturer's discretion. All participating students described a C/LMS as an enhancer of tasks and a convenience. In terms of the practical approach to usage, students suggest that a C/LMS should be used only as a supplement and not a replacement for a lecturer and a traditional classroom.

Students find a C/LMS to be useful in a number of ways. The most significant function, according to all participating students, is its content repository facility. When properly used it simplifies access to notes and academic content at anytime, and from anywhere. It also improves communication between a lecturer and students. The use of chat-rooms is an added convenience in that it enables students to exchanges ideas among themselves in real time. Most students in the UCT sample emphasised, however, that chat-rooms are more useful if lecturers observe, participate and answer questions when students get stuck. This view supports the pedagogical perspective of 'guided learning' highlighted in the inter-pedagogical framework (Figure 5) in Chapter Two.

There are strong arguments that learning over a C/LMS platform is dependent on the lecturer who, according to students, plays a decisive role in whether a C/LMS is used or not, and in how it is used in courses. All sampled students want their lecturers to upload lecture notes, academic content and to use a C/LMS to communicate all relevant information about the course. Students go as far as to expect lecturers to find reading materials and to upload them onto the system – so that students need no longer visit the library or search for information anywhere else. They also want lecturers to continue with traditional classroom duties whilst they (the students) attend optionally. These two final points are interrogated further under the lecturers' section later in this chapter.

Students are calling for a revamp of the traditional tutoring system at universities. They expect tutors (or lecturers) to be available 24 hours a day on C/LMS chat-rooms so that whenever there are questions, there will be a swift response. So, if things were to go according to the preferences of the learners, tutorship would move more towards virtual spaces.

5.2.3.2 Student Experiences with e-Learning

Drawing on the analytical ActAD framework in Figure 9, e-Learning is operationalised as an activity system of collective activities by institutional actors (university and its e-Learning units), the support units, the lecturer (including a courseware developer) and a student. All actors carry out different activities towards the realisation of a common objective. Facilitating the quality of learning is presented as a common goal in the literature and in these findings. On this basis a student is a chief actor and a recipient of e-Learning efforts.

The ActAD framework further states that the success of the activities and the realisation of a common objective (the outcome) is dependent on the interplay between the goals, actors, activities and the mediating factors. Facilitation of different styles of learning (across pedagogical paradigms) over a CLMS is a common objective of e-Learning in this thesis. With regard to mediators, students' experiences point to the IT and network infrastructure, usability of the system, adequacy of technical and literacy support, and intentions as well as the capability and willingness of lecturers – as the major determinants of (or mediators to) C/LMS usage at these tertiary institutions. The technical infrastructure and the responsiveness of the support units play a significant role in this respect.

5.2.3.3 Student Experiences Institutional IT Infrastructure

Students argue that even the most advanced C/LMS is not likely to be usable if it is built on an unreliable IT infrastructure. Whilst UCT students consider their institutional infrastructure as the most enabling, CPUT (Cape Town campus) students find their network infrastructure an absolute nightmare. CPUT network is always down, almost everyday of the week, and regardless of the time of the day. As a result many students are unable to access C/LMS when off campus. Poor network capacity further reduces system response times, making a C/LMS encounter a laborious, lengthy and frustrating exercise. At UWC, however, it is not so much the network, but the availability of the facilities and working conditions associated with the existing computers, that hinder C/LMS usability.

A lack of technical interruptions at UCT leads to high praises for the existing Vula system, though access and usage patterns of Vula differ across faculties – even at UCT.

5.2.3.4 Experiences with Systems Usability and Available Support

Because of the extreme technical difficulties at CPUT, the WebCT/Blackboard system is hardly usable. Though students think the system is well written and not hard to understand, it seldom works. To check notices and to download some notes takes forever. Poor technical support is cited as a major frustration for students in that they have to follow lengthy procedures, such as walking to a distant central administration building and producing some form of identification to qualify for assistance, with password problems being experienced in a remote campus (i.e. Roeland Street campus) in Cape Town. There is no online, telephone or onsite tutor-based technical assistance at the Roeland Street campus, hence the system is, at times, just as good as non-existent.

Whilst no technical hindrances were cited at the Bellville campus, lessons from the Cape Town campus suggests that a system is of no great use if usability is not ensured. A positive example to this effect, where system usability and ease of use were cited as very positive at UCT, supports this point. Students approve of the integration of Vula with the e-mail system, arguing that it helps to inform them on time, whenever there is an upload on Vula. UCT students find the e-mail notification system very convenient. It helps them manage their time better. However, since mobile phones are portable, always accessible and convenient, converging the Vula notification facility with the mobile phone short-messaging-system (SMS) may improve the system usefulness even further. Otherwise, the system is

considered very easy and convenient to use, hence there is a very high rate of C/LMS (Vula) usage by UCT students in the faculties of commerce and humanities. On this point, suggestions were made at CPUT and UWC that C/LMSs should be integrated with e-mail and the mobile phone messaging systems to improve convenience and value to students. Science students are hardly aware of e-Learning or of what the Vula C/LMS is. After some explanations by commerce and humanities students, all the science students aspire to use the Vula system for similar purposes.

5.2.3.5 Student Perspectives on Purposes of Usage

In addition to technical problems at the CPUT, students complain that lecturers are using the system carelessly and inconsistently. However, students have clear preferences on what should be prioritised on e-Learning platforms. At the top of the order is ‘content repository’, followed by ‘notice and information access’, as well as ‘real-time communication’ (through chat-room facilities) between co-students and lecturers. Online assessments, online task submission facilities and online access to assessment marks are included in the priority list, but have lower priority than the above functions. Usage as a source of content and notes is the most understood and popular purpose in sampled groups. As a learning facilitator, a C/LMS can be more useful if it is interactive and has a human mediating element in it.

The most frequently cited frustration among CPUT students is that, despite the clarity of C/LMS features, lecturers still fail to use C/LMSs correctly and as per the purposes for which they are designed. An example of a calendar feature is given, where lecturers ignore this feature and create their own calendar, which is not always easy to locate. Whilst the system has features made for content, lecturers further ignore these and create their own folders where they upload notes in their own way. Students also complain of discretionary use of the system by lecturers, who seem to use WebCT only if they are in a mood to do so. The difficulty is that consistency and predictability is lost, which simply complicates system usage, and reduces the interest held by students.

The question of purpose was highly contested at UWC, with many students arguing that the system should not be used just for the mere sake of doing so, but where appropriate and for the right purpose.

5.2.3.6 Capability and Willingness of Lecturers

CPUT students believe their lecturers are not adequately trained and question their willingness to use the system. A suggestion is that the use of the system should become non-discretionary but compulsory. The same suggestions were made at UWC. Whilst commerce and humanities students had no such complaints at UCT, science students are calling for the compulsory uptake and usage of Vula, rather than any other system or internal website in their faculty.

5.2.4 Conclusion of the Students Perspective of C/LMSs

Students' interviews offer a background insight into issues affecting C/LMS usage. As a contribution to the e-Learning field of practice, Students' explanations place the technical readiness of university network infrastructure, administrative factors of e-Learning facilities, as well as matters of competency and willingness by lecturers – at the centre of the problem at CPUT and UWC. As EOM, et al (2006) suggests for example, instructor knowledge and facilitation, instructor feedback and the structure of the course which is dependant on instructor competency supplement the student's learning style and motivation to determine effective learning on a virtual platform. The role of the educator is therefore important, and limitations in this respect as the findings in the case of CPUT and UWC confirm, clearly limit the effectiveness (and related outcome) of online learning in the perceptions of students. The converse of the same factors confirms positive usage patterns of Vula at UCT. In this respect, students strongly recommend a shift towards the more synchronous virtual learning environments (VLE's) with more active participation into chat-rooms by lecturer's and tutors. According to Piccoli et al (2001), one of the reasons is that most students find it difficult to manage the high degree of control demanded by asynchronous platforms. They tend to feel overburdened by the shift of responsibility and control to the learner, to the extent of feeling isolated and anxious about time management (ibid).

The physical availability and quality of technology facilities also enhances or hinders the actual uptake and impact of ICT (Bridges.org, 2005). A negative co-relationship between poor ICT infrastructure and C/LMS usage by students (and lecturers) at CPUT further confirms this claim.

However, since the aim of this study was to understand how C/LMSs are used by lecturers,

insight from the experiences of the intended beneficiaries (students) is used only as background for discussions with the lecturers.

Findings on the interviews with lecturers in the four universities are discussed in section 5.3.

5.3 Lecturers, C/LMSs and Teaching Activities

Presented in this section are the findings on the factors of C/LMS usage by lecturers in Western Cape universities. Using the sampling method detailed in Chapter 4 (Table 16)**,** this section outlines interview findings with 21 lecturers from CPUT, UCT, US and UWC.

The analysis and discussion is based on the activity theory ActAD framework (Figure 9) in Chapter Three. For operational purposes, independent variables (mediators) within the ActAD framework are further categorised into the technical, social and environmental factors.

Social factors include the understanding of the phenomenon of e-Learning, the significance attached to C/LMS usage in education, perceptions on the ease of use (of a C/LMS), user-skill and the willingness of a lecturer to use the system. The supporting communities of practice within and between institutions are included in this list. On the technical aspect, the list includes the physical infrastructure such as IT networks, the relevant computer hardware and software, the actual C/LMS tool. Environmental factors include institutional issues such as the technical and skills support, functionality of the tools, accessibility of resources to users, e-Learning strategies and procedures, pedagogical considerations, and any other issue considered to inhibit or encourage C/LMS usage by educators in universities.

On this logic, the format of presenting the findings in this section is ‘issue-based’ rather than ‘institution-based’. That is, institutions are mentioned to elaborate and to locate the source of an explanation to the factor of C/LMS usage. A summary of the findings is presented in Table 12 and broadly elaborated in sections that follow.

Table 12: A Snapshot of Lecturer Perspectives and Practices on e-Learning

Mediators	The Status Quo		Explanations	Implications on usage
	Institutional similarities	Institutional differences		
Meaning of e-Learning	At CPUT, UCT, US and UWC, e-Learning is generally described as involving course management, facilitation of learning and better communication through a C/LMS. Association of e-Learning with interactive use of a C/LMS (in learning), represent a dominant view.	There was a minority voice at CPUT, arguing that a computer and a C/LMS cannot be used for teaching and learning, but as mere logistical tools.	Explanations to the common understanding are that learners are not passive recipients of knowledge. They engage, interact, and explore to learn. Direct instruction is passive, ineffective, and using a C/LMS in this way should be rejected. On the opposite account, learning is considered a highly cognitive process that requires dialogical engagement that cannot be offered by a computer system or device.	There is a strong likelihood on the first account, that a C/LMS will be used as an interactive learning platform. On the second account, lecturer will not link a C/LMS with pedagogy. Usage will be minimal, limited only to logistical uses.
Perceived Usefulness	At CPUT, UCT, US and UWC, the use of a C/LMS is considered very useful for communication, and for delivering content to learners. This makes student's life easier, improves teaching efficiencies, and saves time.	A lecturer at Stellenbosch, and at UCT complain that because of a C/LMS students no longer attend classes, and they no longer know how to search for information at common knowledge bases	A C/LMS promotes a sense of entitlement to spoon-feeding. A lecturer is expected to provide, which takes away a responsibility to find own information. It also gives a false sense of assurance that class notes are equivalent to class attendance. The problem is that notes are only a fraction of what is taught in class. Offering lesser materials & asking learners to get the other bit may address this problem	Despite the interactive claims earlier on, the common view on usefulness is that it helps with content delivery, communication, which simplifies the lives of students. Clearly, this is the pattern C/LMS will be put to use. Concerned lecturers may stop using a C/LMS if they had things their way.
Willingness of Lecturers	Noting positive perceptions, the growth of Vula usage among UCT lecturers suggests willingness. Commerce and humanities lecturers at UCT encourage students to use Vula. Several lecturers at CPUT say they are willing but inhibited by facility failures. Three US lecturers indicated willingness, as long as someone else does it for them.	A lecturer in religious studies at UCT is not willing, and is not using Vula. Others at the Centre for African Studies are compelled by students to use Vula, and have hired tutors to do it for them. Reactions were also mixed at UWC.	Willingness is motivated mostly by logistical benefits. There also seems to be a contradiction between declared willingness and reasons for using Vula or WebStudies. A senior professor at UCT and at US said they are willing because it is useful, but also went on to complain that they have no choice because students are calling for this time consuming thing. Both lecturers offered advice for others to delegate all C/LMS tasks to an administrator or a dedicated tutor (because it is just takes too much time).	If C/LMS usage takes too much time to manage then reluctance is likely. Due to pressure they will use it half-heartedly, resulting to dissatisfied students. Driven by willingness, they may need to work longer hours. Is that sustainable? If time is the problem, getting dedicated e-Learning administrative support for lecturers will promote usage.
Usability	WebStudies at Stellenbosch, and Vula at UCT are described as intuitive and easy to use.	Lecturers are extremely frustrated with system failures at CPUT. WebCT is very unreliable, and KEWL needs to improve.	Success is attributed to careful planning, effective development of networks and infrastructure, and dedication of the support structures at UCT and US. The opposite is cited at CPUT. KEWL is still under development.	Usability encourages usage. Similarly, system failures frustrate users and hinder system usage.
Social and Technical Environment	UCT's CET holds regular workshops and training seminar to promote literacy on Vula usage. US's CTL also administers labs, trains users and encourage WebStudies usage among lecturers and students. The help-desks in these institutions are lauded for efficiency.	CPUT lecturers and students complain of limited helpdesk support. Reactions are mixed at UWC.	Positive experiences are linked to management commitment. At CPUT limitations are linked to structural merger complexities. A senior official at CPUT argues that problem is elsewhere, on the operational units which are not fully consolidated. Departments are shifting responsibilities and obligations between them. Only when this structural problem is solved, that other problems will also be solved.	Sound infrastructure and efficiency of the support structures contribute to sound network operations. This promotes system usability, and ultimately, usage. Management is key to this factor. The opposite, unfortunately implies continued hindrances to C/LMS usage.

5.3.1 How Lecturers Understand e-Learning and C/LMSs

As summarised in Table 12, lecturers described their (1) understanding of e-Learning, (2) the purposes and (3) usefulness of a C/LMS, and their (4) patterns of usage.

5.3.1.1 Lecturer Interpretations of e-Learning and Purposes of a C/LMS

Lecturers have varying conceptions on the meaning of e-Learning. The general understanding is that it involves course management, facilitation of learning and better communication through the use of Web-based systems. As shown in the following sections, the concept is confusing to most lecturers. When asked to reflect their understanding, the tendency was to simply give an example of using WebCT, Vula or KEWL to offer content and to communicate with learners. Generally, a C/LMS is offered as an operational tool of doing e-Learning. In describing a C/LMS, perspectives range from the view of a Web-enabled platform to a 'thing' to do certain teaching, learning and communication tasks, an electronic classroom or as an interactive educational resource. It is also seen as a facilitator and a means of carrying out certain learning tasks online. Whilst a few academics describe a C/LMS as a means by which e-Learning is enabled, most educators (like students) hardly distinguish between the terms 'e-Learning' and a 'C/LMS'.

5.3.1.1.1 C/LMS as a platform, a thing, an interactive medium & e-Learning

Lecturers tend to use a C/LMS as a descriptive example of e-Learning. For example, a description of e-Learning as the use of an electronic system for teaching (UWC, G1 – R2), or as an online mechanism to deliver learning (UWC, T1 – R3) implies that e-Learning is both a process and a thing (implying a C/LMS). Predominantly, lecturers tend to describe e-Learning within the 'knowledge transfer' mode of instruction where 'learning is delivered' by a lecturer through the supply of lectures, '*notes, course outlines, slides… etc.*' (UWC, T1-R3) over an online medium. In describing his experience with the use of C/LMSs in e-Learning, for example, this lecturer (UWC, T1-R3) refers to a C/LMS as a platform for content storage and access, as well as a communication medium. A C/LMS is also described as '… *a place where students can get hold of your lectures, your slide shows, their tests, they can post stuff for you, you can post back, there is a discussion board where*

you can introduce topics…where they can discuss things…'(CPUT, C1-R16). Referring to the Vula system, another lecturer described a C/LMS as '… *an interactive resource… like a type of intra-website where one can upload information, students can download information, there is a chat-room, there is a resource, students have access to the calendar… so it is a one-view sort of a place*' (UCT, N1 – R5). A description of a tool as an interactive intra-Website resource also highlights a Web-location with the flexible, 'anytime, anywhere' kind of access to resources, and a synchronous level of interaction.

Two things are notable in these descriptions. The first one is the omission of the word 'learning' in these accounts, which raises questions on whether learning is considered central to e-Learning and whether it is prioritised in the uses of C/LMSs. Secondly, these perceptions are function-based rather than pedagogical-focused. That is, the focus is on feature capabilities that in turn lead to an automatic reaction to somehow try and find uses for it, rather than to come with a clearly articulated pedagogical direction that requires a specific tool to implement. There is no indication that the meaning of learning and the effort to support different styles of learning is considered. With the current perceptions the likelihood, thus, is an inconsistent and compliance-type of system usage. It remains to be seen later in the findings how the uses of a C/LMS by lecturers co-relate to these perceptions.

Lecturers also speak of e-Learning as a thing that a person can use. For example, one lecturer said: '*I used e-Learning as a student and when I was a research assistant*…' (CPUT, I1 – R2). Asked to elaborate, the lecturer went on to mention the name of a C/LMS called WebCT as the 'e-Learning' she had used. The pattern of using the term 'e-Learning' to describe a C/LMS tool is common in lecturer accounts of e-Learning in this study.

5.3.1.1.2 A C/LMS as a neutral instrument to achieve a goal

A C/LMS is also described as an online platform that facilitates various classroom activities. Whilst learning is hardly mentioned in the activities it facilitates, reference to a C/LMS as a '*virtual classroom*' (UCT, N1 – R4) by other lecturers indirectly links the system with some classroom activities that may include learning. At least the interactive presence of the educator and the learner in a virtual environment may be deduced. The teaching aspect, for example, is embedded in another description of a C/LMS as '*a good interface between an academic and a student'* that helps lecturers *'to present stuff that they* [students] *need to*

know, in a fairly structured way' (CPUT, J1 – R8). This lecturer, however, was very cautious not to use the word 'teach', given his explicit view of a C/LMS as a content presentation (rather than a teaching) medium. This stance on the purpose of a C/LMS clearly informs the lecturer's usage patterns and clarifies his decision against trying to use a C/LMS to facilitate learning. In a similar line of thinking, another lecturer described a C/LMS as '*a very easy way to communicate with students*' (US, L1-R6). Narrowing the objective of the interface (a C/LMS), into a means to present information that students need, emphasises 'a content transmission mode of instruction'. It also assumes a sense of submission to pressure from students. For example, a sort of 'they want this, let me give it to them' type of mentality, rather than to say 'I want to achieve these educational goals.' This view of a C/LMS fits the instrumentalist perspective of understanding technology (Feenberg, 2003). In this case technology is considered a neutral instrument (or tool) which is humanly controlled and can only be applied according to user discretion. It has non-deterministic but value-free characteristics in that it can only do what the user wants and cannot shape learning or teaching in any value-laden sort of way. As the trends of usage in the next sub-section show, the instrumentalist approach to the use of technology is clearly reflected in the way lecturers use a C/LMS.

5.3.2 How Lecturers Use C/LMSs

Lecturers were also asked to explain how they are using the C/LMS in their institution, and to clarify their motivations or frustrations (enabling/inhibiting mediators) to use/non-use. They were also asked whether the system is easy to use, to propose reasons for difficulties encountered, and to recommend improved ways of using a C/LMS.

5.3.2.1 Dominant Conceptualisations of C/LMS usage

Lecturers confirmed assertions by students that C/LMSs were being used to supply material and to convey information to learners. One lecturer even said '*… before Vula I used the Website and the general hard drive only to put materials for the students*' (UCT, F1- R4). In the same light, another lecturer referred to a C/LMS as an information repository and access tool – where you '*put readings and references and so forth, onto VULA or on the Website... to access electronic versions of books or articles*' (UCT, A1 – R4). Further, a lecturer from

CPUT said, '*I've been using web-Learning for a while, yes… as a place for students to access information on the site*' (CPUT, M2 – R4). Similarly, a lecturer at the University of Stellenbosch adds that '*putting all the materials onto WebCT is the main use… and then, reminders of test, and sometimes discussions on WebCT on the materials they work on in tutorials*' (US, L1-R8), emphasising that she had '*not really used it beyond this...*' (US, L1-R15). In fact, '… *all the lectures are presented in terms of the slide shows. Slide shows are also saved on WebCT for access by students, who make extensive use of them since they entail the summary of the lecture,*' (US, W1-R4) explains a lecturer of business ethics at the University of Stellenbosch.

UWC lecturers also report similar purposes of usage, with one lecturer of information systems confidently saying: '*We are now using e-Learning quite extensively here, to store relevant documents and information on our KEWL e-Learning site'* (UWC, Z1 – R2) and whilst the '… *intention is to make it interactive, but for now it is a storage – some kind of a repository*' (UWC, Z1 – R4). The conception of e-Learning in this instance is equated with a thing rather than a process.

A C/LMS is also seen as only a tool to do what you are already doing even without it, with emphasis that a C/LMS cannot transform bad teachers into good teachers. To clarify this point, a lecturer asked: '*Can WebCT turn a bad teacher into a good teacher? I would say no,* [US, L1-R14], *I would say that it is a useful tool, but… remember that we are still a contact university, so WebCT cannot replace a lecturer*' (US, L1- R15).

Whilst lecturers and students seem to agree on most of the purposes of C/LMS usage, students prefer the communication aspect to be more interactive. They recommended increased presence of the lecturer and/or tutors on the synchronous interactive online platforms, to guide chat exchanges. On this point CPUT students emphasised the importance of using C/LMS features strictly, as they were intended by design to minimise confusion and inconsistency by lecturers. Lecturers, however, believe that the use should be driven by the goal of the teacher, and that they can only use what they find appropriate and relevant to their goals at any given time. This implies a disagreement with the students' call for compulsory usage of a C/LMS in university programmes.

5.3.2.2 Disputed relevance of a C/LMS to teaching and learning

In support of a content repository approach, several lecturers argue that a C/LMS cannot be a teaching tool. One lecturer at CPUT, for example, said he only uses a C/LMS to '*present information*', but '*not to teach*' (CPUT, J1- R9), adding that it is not a teaching instrument, but a teaching administration tool (CPUT, J1-R10). A professor of economics at UCT also voiced his doubts about the role of a C/LMS in teaching, saying that '*in terms of teaching, I have mixed views on it; in terms of administration, it can definitely be a time saver*' (UCT, A1-R7).

Another lecturer even declared that he does not *'use it for anything else except just to upload notes for students... It does not affect how I teach*' (UCT, F1-R9). Arguments are that teaching requires something more than what a C/LMS offers. Teaching '*takes engagement with a learner. It takes presence',* adding that his '*use of the C/LMS is limited, and is purely logistical*' (UCT, K1 – R7). The feeling is that '*it does help to make some processes easier'* (US, L1 – R14), but it cannot be claimed that teaching improves just because the slides are now on WebCT (US, W1-R17), because '*the teaching rests with the teacher*' (US, L1 – R14). Disputing the use of presentation slides on a C/LMS, simply because one does not believe that the tools can make a positive contribution to learning is illogical, but dismissing a C/LMS as irrelevant in teaching, merely on the basis that lecturer are using PowerPoint slides on it (which you dismiss as irrelevant) is even bizarre. In effect, it is tantamount to saying that: 'Since I don't believe that PowerPoint presentation contributes to learning, using it to present notes on a C/LMS automatically disqualifies a C/LMS from being a teaching tool.'

On the other hand, if teaching over a C/LMS were as narrow as just presenting facts on home page slides and nothing else, then a C/LMS would be critiqued as being minimalist, in particular, because the use would be addressing only one style of learning, the 'linguistic learner' (Garder, 1983) capability of learning. A linguistic learner is a student who is strong on memory, and learns better by memorising words and facts, and to later recall them (ibid.). Even if this was the case, the shortfall would not warrant a dismissal of a tool as entirely irrelevant in teaching, because the learning needs of a linguistic learner also deserve to be met.

However, teaching and learning over an online platform extends beyond the narrow content repository notions to include the constructivist phenomena of mediation or facilitation, and guided learning as well as discovery and collaborative learning among other forms. Despite the abundance of scientific (and anecdotal) evidence to support the educational value (i.e. the work of Koshmann, 1996) of educational technology to facilitate teaching and learning, the facilitation phenomenon was also disputed by some lecturers. A C/LMS, for example, is considered '…*OK as a medium to remind people of things they already know, but not as a tool for learning new things*' (CPUT, J1-R10). Reasons are that it is a human-made, non-cognitive artefact that can only offer artificial and pre-programmed solutions (ibid.).

There are critical voices, however, that accept the usefulness of a computerised system and multimedia in facilitating teaching and learning. A survey into ten universities in the United States of America (USA), for example, divides the uses of a C/LMS into 'significant' and 'insignificant' categories (Martin et al., 2008). Significant usage describes 'a meaningful instructional activity' that includes delivery of content, holding discussions, having synchronous events etc., as opposed to using it administratively or logistically to maintain course registration lists, posting a syllabus, posting grades etc. (ibid.). Whilst logistical purposes are also significant, delivery of content, the holding of discussions and having synchronous events according to this critical perspective, has an educational value in teaching and learning over a C/LMS.

5.3.2.2.1 Challenging the dissenting voice

Contrary to the view that a C/LMS and multimedia are not ideal for teaching, an educational psychologist and expert in multimedia learning, Mayer (2001; 2009) presents 12 principles that can help enhance rather than hinder learning. Mayer's principles build on cognitive psychological aspects of learning with objects to recommend a balanced combination of visuals, text, graphics, note-taking facilities and, most importantly, the voice of the educator in PowerPoint presentations to facilitate learning (ibid.). On this point, lecturers who use PowerPoint to present content in C/LMSs should think beyond the logistical ends, and use PowerPoint presentations in ways that help students learn. In this respect, UWC students recommended the recording of lecturers so that they can listen to the lecturer whilst viewing the PowerPoint slides on the KEWL system. Lecturers who share and pursue this alternative

at UWC, however, cite a lack of resources and technical support as hindrances (UWC, L1 – R28; R29).

If the primary goal of the teacher is to get students to learn, which is what the goal of using PowerPoint presentations in classrooms should be, then teachers should be asking whether using PowerPoint slideshows in a physical or virtual classroom will help or hinder the learning (Finkelstein & Samsonov, 2007). A very informative argument on whether a C/LMS plays a role in the learning process is offered by a lecturer of information systems at UWC. In his explanation he separates the purposes of a C/LMS into two levels, which he names level 1 and level 2. In the first level, a C/LMS only assists in improving logistical efficiencies and in saving time and costs, rather than improving teaching or learning (UWC, T1 – R16). In the second level, however, it helps to mediate learning in various forms and ways. Students '*can actually go back to their lecture notes and review them. If there is anything that they might have forgotten, they may go back to the material online and see, hear or listen to what was said in class and remember things, etc*.' They may be inspired to relate a C/LMS encounter with various contextual experiences, with the option of referring back to the educator or classmates for further discussion and clarity (UWC, T1 – R15).

Reducing a C/LMS into a mere logistical tool that has no role in learning, therefore, seems ill-informed and misleading. A lecturer, from this instrumentalist perspective, is elevated into the sole custodian of knowledge which, unless he/she is present and interactively transfers knowledge, learning 'cannot' take place. On the contrary, learning according to the constructivist theory of learning is also constructed from exposure and engagement with relevant environments. Further, since the learning abilities may vary from learner to learner (Gardner, 1983; Mainemelis, et al, 2002), various pedagogical techniques, such as direct instruction, guided, discovery, experiential (Kolb, 1984), and collaborative forms of learning, may be necessary to address each learning need. The lecturer, therefore, cannot be the sole custodian but is also a mediator of knowledge in varying environments and contexts, including physical and virtual classrooms. In effect, '*a student that sits and concentrates in a lecture is doing one sort of learning. The student who sits at home, turns on his laptop and relaxes in front of the screen as if he is watching TV, is doing a different sort of learning. For some students they will actually remember that more. The brain wave systems are different:*

alpha waves and beta waves, and it will be very nice to offer students both options' (UCT, A1- R7). A suggestion in this statement is that whilst a C/LMS enables some form of learning, it is by no means an adequate learning platform on its own. It is not a panacea that can support all learning needs and abilities, but needs to be used in conjunction with other methods, including the face-to-face classroom method. On this point, students request an increased usage of a C/LMS together with an increased participation of the human element - a lecturer and tutor. The blended model of instruction is therefore recommended.

Clearly, lecturers who do not accept a C/LMS as a teaching or learning medium (tool, facilitator and mediator) are less likely to use a C/LMS for teaching, or in a way that mediates learning. Whilst this section clearly shows that lecturers are using C/LMSs mostly for logistical and administrative purposes, it is important to understand the level of significance that lecturers attach to a C/LMS in its current uses.

This thesis takes the critical view that a C/LMS and related multimedia tools should not be viewed merely as the logistical instruments, but should also be used to add value to teaching and learning, across different pedagogical paradigms.

5.3.3 On the usefulness of a C/LMS

A C/LMS makes things easier. As an instruction delivery medium, a C/LMS can also help universities to deliver their offerings to larger numbers of students, offering a potential for universities to even increase their student intake. It improves efficiencies and it offers an opportunity for contact universities to increase student intakes, manifold:

> "…*as broadband becomes a norm, and will become a lot cheaper in South Africa, the possibility for students to actually sit at home rather in the lecture theatre may become something we can consider... the potential for expanding our offering is huge. …what is holding us back (from expanding)…is the room and the lecture theatre.*
>
> *We do not have the facility to have more than 400 students in a lecture theatre, and we only have effectively eight periods a day. So…even if the same lecture is offered eight times a day, we can't physically have more than three thousand plus students doing that course…surely the electronic media and the computer system that we have here will offer one way around that*" (UCT, A1 – R10).

As the quotation elaborates, lecturers find a C/LMS to be useful, mostly as a logistical tool. When it comes to course administration for example, lecturers describe the electronic facility

as making things easier (UCT, A1-R4). Perceptions on the levels of C/LMS usefulness vary between institutions, with UCT and US lecturers reporting the highest and CPUT reporting the lowest levels of satisfaction with their systems. Perceptions are mixed at UWC.

5.3.3.1 Usage and usefulness of VULA at UCT

Uptake uptake and usage of Vula has grown significantly since its inception in 2006 at UCT. In effect, the total number of sites created on Vula grew from 191 in 2006 to 1 546, with a total of 155 051 non-distinct users in 2009 (Marquard, 2010). By the end of 2009 an average of 21 347 students (88% of the 24 393 registered student population in 2009) was using Vula at UCT (ibid.). The number of active staff and guest users has also been growing phenomenally since 2006. The status of Vula usage at UCT is presented in Table 13.

Table 13: Status of Vula Uptake and Usage

Year	Total course sites created	Users with role of owner, lecturer or support	Active students	Staff: Lecturers, researchers, administrator.	Guest users
2009	1546	1399	21, 347	2,873	3,405
2008	1348	1202	20, 351	2,313	3,221
2007	907	505	16, 861	1,141	1,436
2006	191	242	N/A	N/A	N/A

Data source: CET Annual Report (2009).

In addition to the high growth rate of usage, lecturers have positive perceptions on the usefulness of Vula in education. For most lecturers '*it is very helpful to be able to put readings and references and so forth, onto VULA or on the Website*' (UCT, A1-R4), and '*it makes it very easy to communicate with students and for them to communicate with you…*' (UCT, J1 – R9). The advantage of using turn-it-in software to check plagiarism is mentioned among logistical benefits (UCT, A1-R6). A 25-year-old lecturer in the Department of Management Studies captures the impression of her colleagues at UCT: '*I just find it exceptionally useful for tutorial sign-ups, for creating groups, and for communication. In general as far as I know, most lecturers do make use of it now – just because it is so easy*' (UCT, F1 – R11). A lecturer in the Department of Political Studies adds that it makes him

more accessible to the student, saying '…*they can communicate with me very, very easily*', adding that he had received more communication and more comments from the students now than in the years preceding the use of VULA (UCT, J1 – R14).

A co-relationship between age and the understanding of C/LMSs among lecturers also emerged at UCT. Whilst the majority of lecturers below 40 years of age demonstrate a clear understanding of C/LMS uses, older lecturers are delegating their C/LMS responsibilities due to limited understanding of computers (UCT, A1-R5; UCT, F1-R8; UCT, H1-R4). Most lecturers above 45 years of age in the faculty of humanities were seldom clear about the usefulness of the Vula C/LMS. Explanations were that they do not understand the system, or even know how to use it, and as a result they have administrators and young tutors who manage, upload things and who engage students on their behalf. To this effect an economics professor with 30 years of lecturing experience at UCT says: '*I have a tutorial assistant who manages all of that, and who has this pretty much as the full time job*' (UCT, A1-R5). Because of such administrative support, their limited computer literacy is clearly not a hindrance to C/LMS usage.

Asked to explain reasons for using something they don't understand, pressure from students is cited. A political science lecturer, for example, said, '*Why use VULA? It is now expected by students, and that is where they would all expect to find information, but the hard drive is just as useful*' (UCT, F1-R8). Asked why he is using Vula, a 50-year-old lecturer who admits a lack of computer-user skill due to limited exposure in humanities background, also cited requests form students who had some engineering background. They '*started requesting that we put up notes on the e-Learning system – VULA*' (UCT, H1 – R4) and '*yes, we had to get someone to do it for us. A colleague… had a young research assistant who knew how to do this. Basically she puts up the notes for us, …everything, on her own*' (UCT, H1-R6). The lecturer concluded that since he does not do anything himself on Vula, but simply passes on his notes to the young research assistant, he does not have insight into its practicalities (UCT, HR – R9). Satisfaction with the supporting environment further encourages usage.

5.3.3.2 Usage and usefulness of WebStudies at Stellenbosch

To get an indicative percentage of C/LMS usage at Stellenbosch, a number of student users is compared with a number of students enrolled in respective faculties at the university. An average of 13 818 undergraduate students or 96% of the total of 14 323 registered students across the ten academic faculties had at least one module on a C/LMS at the University of Stellenbosch in 2006 (CTL, 2008). The figure was 94.7% – or 13 999 out of 14 770 students in 2007. The number grew to 97% in 2008, with 14 556 of the 14 934 registered undergraduate students having at least one module on WebStudies in 2008 (ibid.). Because of limitations in the limited availability of data sources, only the student usage indicators could be accessed and presented in Table 14.

Table 14: A Snapshot of WebStudies Usage

Faculty	2006			2007			2008		
	Registered Students	Active students	Percentage	Registered Students	Active students	Percentage	Registered Students	Active students	Percentage
Arts	3076	3007	98%	3258	3173	97%	3216	3184	99%
Natural Sciences	1110	920	83%	1515	1494	99%	1488	1485	100%
Education	1410	1404	100%	570	562	99%	577	575	100%
Agriculture	548	547	100%	1138	796	70%	1065	915	86%
Law	382	378	99%	402	398	99%	401	400	100%
Theology	102	102	100%	99	96	97%	119	119	100%
Economics & Management	4275	4174	98%	4386	4321	99%	4470	4427	99%
Engineering	1449	1436	99%	1486	1478	100%	1552	1546	100%
Health Sciences	1732	1699	98%	1712	1681	98%	1665	1652	99%
Miliary Academy	239	151	63%	204	0,0	0,0	381	253	66%
Totals	14323	13818	96%	14770	13999	95%	14934	14556	97%

Source: CTL Annual Report, (2008) NB: 2009 Data not available during the time of writing.

Lecturers at the University of Stellenbosch University also find their 'WebsStudies' C/LMS (updated version of WebCT) useful, mostly for purposes of storing content, communication, and for assignment submission (US, W1-R5; US, L1 – R6). To this end a respondent with

more than 30 years of teaching experience elaborated: '*I find it to be a very easy way to communicate with students. It also opens up certain possibilities, but mostly, improves my communication with students... it made it possible for me to give students access to articles to study materials that I would otherwise send them to the library for*' (US, L1-R7).

Similar to the other universities, lecturers at the Stellenbosch also use their WebStudies – predominantly to store content and to communicate with learners, sometimes to the extent that students may no longer have to make their own searches of information in the library.

5.3.3.3 Usage and usefulness of KEWL at UWC

Statistics on the uptake and use of KEWL was not available at UWC. Internal sources doubted if that sort of data is being kept or preserved in the institutions.

With respect to the perceptions on the usefulness of KEWL, lecturer perspectives on the usefulness of a C/LMS are mixed in this institution. They range between positive conceptual beliefs and limitations in practical experience. On the positive aspects, KEWL just '*makes it so much easier for lecturers and students to put what can be put on the e-Learning site for accessibility at anytime and from anywhere where there is an internet connection*' (UWC, Z1 –R3). It saves costs as you do not need to print things, and it helps in keeping records (UWC, T1-R14). It is also considered '*pretty straight forward*' and '*very easy, you log-in you can download some stuff. It also has some interactivity*' (UWC, Z1 – R12), with the strong point being '*the flexibility that it affords you, if you have internet access*' (UWC, Z1-R18).

Citing resource limitations for students, a senior lecturer in the Department of Information Systems complains that they have '*not been very successful at getting the universal access for all students on the e-Learning system*', hence, '*usage has been quite limited... that has tended to diminish the value of… the e-Learning work space as a mechanism for disseminating and sharing knowledge*' (UWC, G1 – R3). Lecturers and students are in agreement about this problem at UWC.

The lecturer further complains about the usability of the system, citing administrative procedures such the registration of students as being inefficient and burdensome. '*Apparently*,' adds the respondent, '*I need to send the list of the students to someone in e-*

Learning so that they can all have access on the course. And then I have to do this for every module of the course... and there are seven modules in it. So, it does not link the course together and I have to repeat this exercise for all seven modules. So, for the value that I'm getting out of it, it hardly seems worth it. What I would recommend? Simplifying processes, and make it more user friendly' (UWC, G1 –R5). Immediately the lecturer expresses an indifferent attitude, saying in his explanation that '*because I have not seen anything to be excited about on this e-Learning system*' (UWC, G1 – R8) '*it does not make a difference*' (UWC, G1 – R9). This frustration is shared by many lecturers at UWC. Asked to explain her concerns about the KEWL system, a lecturer in political studies adds that it is having to send the class list '*off to the central e-Learning people so that they can*' activate it onto the system, adding that '*on previous occasion I asked them to do it for us it just never got done*' (UWC, L1 – R15).

Whilst students had complained about limited commitment to C/LMS usage by lecturers, this section confirms limited usage and explains it to an unsupportive institutional environment for lecturers in the institution.

5.3.3.4 Usage and usefulness of WebCT/Blackboard at CPUT

Information on the uptake and use of WebCT at CPUT was misleadingly questionable and of unreliable use.

With regard to the perceptions on C/LMS usefulness, CPUT lecturers believe in the usefulness of a C/LMS at a conceptual level. Practically, they cannot fully exploit the perceived usefulness – due to extreme technical failures. One lecturer, for example, states that '*if it works it is fantastic*!' (CPUT, C1 – R15). Whilst '*WebCT makes it relatively easy to present stuff to students in a fairly structured way*' (CPUT, J1 – R6), the problem is that it never works, at least not consistently (CPUT, I1 – R6). As a result, usefulness is inhibited. The fact that '*at half the time you cannot get on it reliably, so there seems to be no point in starting something that you know students are going to struggle with – not from a content point of view but from an access point of view*' adds one of many frustrated lecturers who had to limit their use of the system as a result (CPUT, J1 – R10).

Even in times when it (WebCT) works, its procedures are time-consuming. It is not user-friendly. It is technically slow, and is not logically developed (CPUT, M2 – R17). The

difficulty according to the lecturers is that the current WebCT and Blackboard system does not '*take into account the intricacies of how humans think… it can be quiet rigid*' (CPUT, C1-R16). For example, '*sometimes you want to do three things, but you can't do all three at the same time. You cannot load three files all at once. You have to go back, and you cannot just go back by, say one page back, but three pages back and then load something again*' (CPUT, C1-R11). Perceptions on the uses and usefulness of C/LMSs are not unique to one university, but seem to be generally held by lecturers across institutions.

5.3.4 Common Perceptions across Institutions

On the benefits that a C/LMS has for students, lecturers seem to agree on the convenience and flexibility of access to materials (UCT, H1-R8; CPUT, C1-R18; US, L1-R16). A C/LMS simplifies logistical processes for lecturers, and *'students can view their marks... as soon as you finish marking you can make it available for students to view at any time*' (UWC, T1 – R14). On self-assessments with automated feedback, students can also gauge their levels of understanding, thus highlighting areas that require additional attention, at their time, space and pace (CPUT, W1-R19).

The general thinking is that a C/LMS makes it easier, and maybe easier than it should be, for students to search and access learning materials (UCT, H1-R11; US, L1-R7). However, lecturers are not without concerns, with fears that a C/LMS threatens to render the lecturer and the traditional classroom redundant, being raised both at UCT and CPUT.

5.3.4.1 Lecturer concerns: negative impact of a C/LMS

Whilst it is considered useful logistically, lecturers are wary that a C/LMS could end up replacing their roles as educators. A lecturer, according to one concerned 50-year-old educator, '… *is in a sense running a risk today – of being redundant; why should a student come and listen to me when they can listen to the best economist in the world, just by turning on their computer? Why should I be the person setting their assignments whilst the person who wrote their text book could be perhaps setting their assignments… I may well end up as a person who turns the machine on in the morning or downloads stuff from the Web to pass on to my students. The university itself, as an institution, is under threat*' (UCT, A1-R8). Since his computer literacy is limited, this educator uses Vula indirectly through his

tutors – hence his sceptical view on computer systems.

Further concerns are that a C/LMS '*is changing the way students are consuming information … there is much higher demand of having everything ready at the click of the button… whereas before, they were kind of happy if there were enough handouts at reception… Now you find students are too demanding, and are really helpless in terms of finding information*' (UCT, N1 – R12). The concern is that '*at times it* [a C/LMS] *makes them to just stop thinking because everything is available*, *and you think, well, if I don't know it, I'll google it*… and … *there is now this uncritical consumption of information and I know of some lecturers who say at the end of the day I want them to go to the library and read up*' (UCT, N1 – R23).

A C/LMS also encourages students to rely on given content, rather than to use their ability to search for and find their own sources. In the words of a Stellenbosch University lecturer, for example, a C/LMS tends to '*make the students lazy... because they no longer know how to use the library properly, they don't learn the skill of really searching for materials in the library*' (US, L1-R7). It is also feared that a C/LMS may be encouraging students stay away from classes. Emphasising this concern, a 25-year-old management lecturer said, '*We are a physical, face-to-face university…'* and *'we want students to attend classes*' (UCT, N1 – R32). So, '… *if they should stop attending lectures, that will be a problem, because some simply think that they can access these things on VULA and not come to their lectures*' (UCT, H1 – R11), adds a senior lecturer within the humanities faculty.

Interestingly, UCT students also confirmed this point – arguing for more lecturer presence on the system so that they can only attend classes at their discretion. The measure of a fully matured e-learning environment, according to these students, is one which is adequate to empower students to access and engage in all forms of learning online – without having to attend a physical classroom. At the same time, students want lecturers to continue teaching so that they can have a wide pool of options; that is, to stay online or attend a contact classroom if convenient. Reasons are that whilst a C/LMS does encourage them to stay away from lecturers, they lack the human mediator element, hence they cannot replace lecturers. If students are requesting more tutor and lecturer presence on the chat system online, then the physical classroom may truly be at risk of extinction.

The challenge for educators, therefore, is to meet students' expectations whilst finding ways of using C/LMSs in ways that adds value. Lecturers need to ensure that the use does not incapacitate learners from finding their own information sources, and does not encourage students to miss classes. Like most lecturers interviewed in this study, one UCT lecturer is wary of a policy that may prescribe the use of a C/LMS to lecturers.

The only time this lecturer would support a compulsory policy initiative is '*if it is about getting a common platform… a single source for students to identify with',* and not '*… if it was to say that that would be the only manner to get students to know*' (UCT, K1 – R10). Because of limited usage at CPUT, and because students do not understand for sure where the blame lies, students are calling for a policy that will compel lecturers to use a C/LMS. Disagreement between lecturers and students on this point is evident. Further, it is questionable how a prescriptive policy would improve usage if the problems lie with limited infrastructure, limited network capacity, and inadequately coordinated C/LMS administration in this institution.

5.3.5 Explanations: Mediators of usage/none- usage

Findings in preceding sections show the highest level of C/LMS usage by lecturers is at the University of Stellenbosch, followed by UCT with a high, but not universal, rate of usage. A high rate of the Vula C/LMS usage is reported in the humanities and commerce faculties. Usage ranges from minimal to non-existent in the Science Faculty, with a number of students (during data collection) not even knowing the name of the available C/LMS at UCT.

The findings also show limited patterns of C/LMS usage at CPUT and UWC, for various reasons and, predominantly, because of IT infrastructural limitations. According to the work-activity analytical framework, actors in activity system carry out activities with a goal or purpose in mind. Further, the success or failure of an activity, and ultimately the realisation of the end goal, is shaped by contextual factors called the mediators. As shown in Figure 9, mediators may either be the enablers or inhibitors of a work activity and goal realisation. This section draws on this activity theory notion of mediators to explain the patterns of C/LMS usage in sampled universities.

5.3.5.1 Mediators of C/LMS usage

Content repository, communication and assignment management functions are the frequently cited purposes of usage in sampled universities. As an elaboration to Table 12 at the beginning of this section, explanations to C/LMS usage (or non-usage) patterns by lecturers are presented per institution in Table 15.

Table 15: Mediators of C/LMS Usage at CPUT, UCT, US, and UWC

Institution	Mediator Status: enabling (✓); inhibiting (X); Mixed (✓X)						Mediating factors of C/LMS usage by lecturers: Abbreviations - Access-ability (ACA); Function as Expected (FaE); Usage mediation (UM); Perceived usefulness (PU); Perceived ease of use (PEU), and education & information support (EIS)
	PU	PEU	ACA	FaE	EIS	UM	Explanations to the mediator effect (a synopsis of interview transcripts)
CPUT	✓	X	X	X	X	✓X	A C/LMS is considered to be useful (PU). However, it is hard to use (PEU), due to unreliable accessibility (ACA). It hardly functions as expected (FaE) due to limited network capacity. C/LMS administration and support is inadequate, and thus discourages usage (EIS), hence lecturers and students are unable to use a C/LMS in ways they prefer. Slow response times, limited user-friendliness, unreasonable C/LMS registration procedures and ineffective helpdesk (UM) hinder C/LMS usage at CPUT, 80 Roeland Street Campus. A perceived policy to use the system however, compels reluctant lecturers to keep trying the system. Resistance to change was not evident.
UCT	✓	✓	✓X	✓	✓X	✓X	The Vula C/LMS is considered very useful (PU), with reliable accessibility (ACA) for humanities and commerce faculties where it is highly used. It was however, not available for science students at the time of writing, due to departmental and lecturer omissions. Users are satisfied with constant functionality (FaE) and ease of use (PEU). Lecturer expectations are clearly communicated to students, Vula is integrated with the e-mail system to alert students of new entries. Students recommend the extension of this notification facility – to the mobile phone SMS system. Otherwise, the helpdesk is very effective and lecturers have the administrative support to manage the course on the Vula C/LMS (EIS) at UCT. Unexpected power failures or routine maintenance are understandable temporal hindrances (UM), but there are administrative decisions that tend to hinder access: non-commerce students often overpopulate commerce labs at the expense of commerce students, due to limited opening hours in other faculties' labs. Older lecturers without skill delegate C/LMS functions to skilled assistants, mostly, due to students' demand for the use of Vula.
US	✓	✓	✓	✓	✓	✓X	All US lecturers use the Web-Studies C/LMS. They find it useful (PU) and easy to use (PEU). Helpdesk and literacy support is efficient (EIS). Almost every building has a 24hr accessible lab with support staff to ensure functionality (FaE). Students with personal computers may also access internet in their own rooms (ACA). Routine maintenance may limit usage temporarily in certain cases, but it is always well managed and understood by users (UM). The e-Kampus policy (that requires course presence online) rather than demand from students has some compliance effect to C/LMS usage.
UWC	✓	✓	X	✓	✓X	✓X	A C/LMS is considered useful (PU). The KEWL NextGen is considered easy to use (PEOU) and facilities are often functional (FaE). However, they are not always available for C/LMS usage by learners who predominantly, also lack access to the internet outside campus (ACA). Literacy support exists, though lecturers under-utilise it (EIS). Complains however, are that it often takes longer for technical faults to be fixed (UM). C/LMS usage and e-Learning culture is motivated more by innovative driver initiatives than by student demands or policy at UWC.

Source: Interviews with lecturers at CPUT, UCT, US and UWC.

Table 15 outlines the status quo and explains the mediators' C/LMS usage in four universities. It shows a unanimous belief in the usefulness of C/LMSs among lecturers. Goals of usage among all lecturers, however, are limited to content storage and retrieval as well as communication. The value of a C/LMS from this perspective is its capacity to let you do more with less (UCT, A1-R8; UWC, T1- R5). Viewed in this manner, an objective or goal, rather than pedagogical focus is implied, a view which confirms students' claims that usage depends on the subjective goals of the lecturer.

However, a goal that is purely logistical, with no attempt to facilitate different styles of learning, ignores learning (and the needs of the main beneficiary of e-Learning) which is the core of C/LMS usage. Such a stance is strongly challenged in this thesis. Table 15 is elaborated in detail in the following sections.

5.3.5.1.1 C/LMS usage mediators at CPUT

To elaborate on Table 15, Students and lecturers describe the WebCT Blackboard system as well written (CPUT, J1-R8), but practically difficult to put into use. It is not '*an easy system to figure out and use*' (CPUT, C1-R8) even if you are computer literate. Usability is limited and '*it is not intuitive*' (ibid.); for example, '*there are so many things that if you get wrong, you can't fix it but had to do it all over again*' (CPUT, C1-R8). A major source of frustration is that it does not allow one to load more than one file at a time; '*you have to go back, and you cannot just go back by, say one page back, but three pages back and then load something again'* and '*in most cases it is quite slow*' (CPUT, C1-R11). The network capacity seems inadequate, and the technical support is under-capacitated (CPUT, J1-R10).

Explanations, according to most lecturers, are that '*the network people are not talking to the e-Learning people. If you experience technical difficulties and you contact the e-Learning people you will be told that it is a network problem and you should contact the network people. The network people will also tell you something else, so, the problem keeps going on year-in year out*' (CPUT, J1 - R17). Asked to explain this further, the lecturer says: '*The problem is much deeper than just for a lecturer sending a complaint. It is a structural problem*' (CPUT, J1 – R18), most certainly because '*technical departments come from a merger of two departments from two pre-merger technikons. They came together, and whilst they need each other to function effectively, instead of working together they hardly*

communicate... a direct result of the technical services not being coordinated with the functions of the network people' (CPUT, J1-R19).

One course coordinator explains that she had tried to encourage lecturers and students to use the C/LMS on her course, with no success. The coordinator wanted other lecturers and masters students to use the system so that she could monitor progress, but *'could not get them to use it… They just never did…'* (CPUT, C1-R6). In addition to technical limitation, lecturers and students can only use the system if they see the need and the appropriateness of the system to address that need. In this particular case, '*it seemed that they just did not see the need. If they don't feel the need, then why push it*…' (ibid.). To support this point, one lecturer explains why he is not using the assessment feature of WebCT, saying that '*things like online examination, etc, are great for say, first to second year multiple choice questions,* [but] *at our level…we tend to ask more explanatory essay type questions…'* hence, *'that mode of use is not of much use…*' (CPUT, J1-R10).
Therefore, limited infrastructure capacity, inadequate coordination of networked systems and limited technical support are the negative mediators (inhibitors) of C/LMS usage by learners and educators at CPUT. Hence trust and confidence in the appropriateness of WebCT in affected campuses and departments at CPUT is minimal.

5.3.5.1.2 C/LMS usage mediators at UCT

As shown in Table 15, lecturers perceive the C/LMS to be useful (PU) and very easy to use (PEOU). Users in the faculties of commerce and humanities find it user-friendly, always functional and accessible (ACA and FaE). Additional mediators are that the Vula designers avoided unnecessary complexities in the interface, by keeping it as simple as possible and only including features that are needed in the institution. Further, lecturers communicate their expectations clearly and frequently to students in class. The helpdesk service is professional and efficient. The coordination of the C/LMS with the e-mail services helps users know when there is a new task that needs their attention, so they can log-on to Vula. In addition, the coordination of Vula with students' records eliminates tedious administrative tasks for lecturers. For example, students who are registered for courses in the central records department are automatically registered into courses on Vula, which means lecturers do not need to enrol individual students into their courses. Availability of lecturer assistants and the tutorial system also helps the lecturers make better use of the system,

whilst not compromising other academic responsibilities. As a result users are always motivated to use the system, with students speaking very highly of the system.

However, there are exceptions to this level of satisfaction in other faculties. The closure of computer labs after hours limits access and usage for non-commerce students. The affected students often ask their commerce friends for access to the commerce labs. In this way they take the place of legitimate commerce students who then cannot find a computer in their own lab. The faculty of science, however, is lagging even further behind. Lecturers are considered unwilling, system usage is not promoted or supported, and most of the faculty students in focus group discussions had not even heard of the Vula C/LMS or knew what it really is about. Computers that are in poor working condition in the science labs, a lack of relevant software programs, and unhelpful lab staff hinder the use of computer facilities in the science faculty. This situation is in direct contrast to developments in the commerce and humanities faculties. Explanation from students suggest that the nature of science studies is different and requires more specialised (rather than general) learning resources used in the rest of other faculties. Science students, however, fear that they could be missing out on the benefits of Vula, and were recommending the use of Vula (as of in 2007) in their faculty as well.

5.3.5.1.3 C/LMS usage mediators at US

All sampled lecturers at the University of Stellenbosch perceive the C/LMS to be useful for content storage and distribution, and for flexible communication with students. Lecturers find the WebStudies platform to be adequately supported at the university. Students have easy access to computer facilities 24 hours a day, and since computer laboratories are professionally managed, with qualified teams of support staff who look after facilities and support learners when they have problems, computers are always functioning optimally. Not only does every department and almost every building have a large computer facility, but also university hostel rooms have network lines installed to enable students with personal computers to connect to the Internet from their own rooms. Lecturers also find the helpdesk facility to be very professional and efficient. In case of a technical failure, argues one lecturer, the technical support person would even log-in to your computer remotely and fix it directly from his office, and the WebStudies (e-Learning) division is always very supportive (US, W1-R14). They see to it that lecturers are registered into WebStudies, and all students are automatically registered into the C/LMS as soon as they are centrally enrolled for the

course (SU, MvR R-1).

Whilst the environment is fully supportive and the system is user-friendly, lecturers are still not using the C/LMS for purposes other than content repository and for communication. Despite the supportive environment, lecturers say that preparing for online presence can be time consuming (US, L1 – R8). Using a C/LMS for purposes other than content storage or communication, thus, would need more time than they have, given their other research and lecturing responsibilities that they have (US, L1 – R10). The belief is that a C/LMS is a mere support tool that should not be used to replace lecturers in contact universities. C/LMS usage therefore, should be optional and purpose-driven. It should be encouraged, but not imposed upon lecturers (SU, SW –R6). Similar to the humanities practice at UCT, the Department of Afrikaans and Nederlandse studies at Stellenbosch appoints one administrator to manage the content repository function, the practice which a senior professor at the department recommends to be the answer to the time-consuming aspect of using the system (US, L1-R9). Whilst lecturers do not feel pressurised to comply with the online presence principle of the e-Kampus policy, the policy does influence usage patterns indirectly (SU, SW –R6; US, L1 – R13).

5.3.5.1.4 C/LMS usage mediators at UWC

All lecturers in a UWC sample were using their KEWL system to provide notes. Computer-literate lecturers also find the KEWL NextGen system easy to use (UWC, T1 – R28, R29). Lecturers with limited computer literacy, however, think the training offered by the e-Learning division is artificial and often confusing. One lecturer, who is also the head of department, explains, for example, the frustrations that he and his colleagues have had with the KEWL training sessions. The lecturer (UWC, K1 – R9.2) says that '*lecturers would go to some venue to attend the training. When you get there, the monitors are not up, or have an inappropriate software, etc…'* To improve the situation, he advises that *'attention should be paid to ensuring that during training – that every computer is identically configured and ready to use, before the stuff arrives*' (ibid.). Whilst this refers to procedural limitations, the approach adopted by the trainers is also confusing, and this discourages lecturers from attending further training. In most cases, adds the head of department and lecturer (UWC, K1-R9.3), '…*nearly all computer instructors and manuals always assume that the learner knows many steps not written in the manual, or they will impatiently grab the mouse and*

click on a lot of things at a lightning speed to try and teach you something. Mostly you as a trainee do not have a possible ability of learning it off by heart when someone goes very fast in front of you, and you are not able to write all the steps to refer to it a number of times before you can know it' (UWC, K1 – R9.3).

The lecturer (UWC, K1 - 9.4) further complains of ill-founded assumptions by instructors that *'whatever is the latest buzz-jargon of this year is already known to all the academic staff members*'. The suggestion is that trainers should '*explain any jargon that has recently come within the last five years. Further more, the presenter should enlarge the icons on the screen of their presentation so that the trainees will be able to see which icon is referred to*' (ibid.).

Technical instability and inefficient support are seen as limitations (inhibitors) to lecturer usage of KEWL at UWC. In the words of the same lecturer (UWC, K1 – R12), '*Technical service is a very serious problem at UWC. Overhead projectors, for example, when the bulbs are gone, you have to complain week after week, and I have to waste my departmental time in nagging repeatedly before things are repaired weeks late or at the end of the quarter*…' In terms of poor helpdesk service the lecturer says: '… *these departments close at 16h30pm, and we are lecturing until 20h00 pm… When a problem happens at 4 or 5 pm on Friday, nothing can be done until Monday*' (ibid.).

Whilst all interviewed lecturers believe in the usefulness of C/LMS, they all admit to be using it extremely minimally (UWC, G1 –R3). Limited relevance of software programs to lecturer needs is frequently cited. In the words of another lecturer, *'… the staff will go to some course, and will be told that it is here in this CD. We then rushed back to our office, and discover that we did not have a CD slot, but a floppy disk in our computers. We would then have to apply to have the CDs added, only to be told that your computer does not have enough memory to handle the CD facility. You will then have to wait for another two months applying for that, and eventually get a response that says no, there is no budget for that. By the time, two years later, when you have a computer that could handle what you have been asking, you have totally forgotten what was in that course'* (UWC, K1 – R9.3).

In addition to the slow administrative process, another lecturer complains about the tedious processes that have to be followed in order to get students registered on the system, saying… '*Apparently, I need to send the list of the students to someone in e-Learning so that they can all have access on the course. And then I have to do this for every module of*

the course. Now I am only doing one course and there are seven modules in it. So, it does not link the course together and I have to repeat this exercise for all seven modules. So, for the value that I'm getting out of it, it hardly seems worth it. What I would recommend? Simplifying processes, and make it more user friendly' (UWC, G1 – R5).

Technical inconsistency, limited technical support, and resistance to change on the part of reluctant colleagues play a negative mediation (inhibiting) role in this institution.

5.3.6 Conclusion on a Descriptive Presentation of Findings

Findings show an almost unanimous belief in the usefulness of C/LMSs in facilitating learning processes among all student and lecturer participants, with major disagreements on the operational details. Secondly, whilst the social and technical environments limits access, usability and usage of WebCT and KEWL NextGen at CPUT and UWC, the absence of these hindrances co-relates positively with high patterns of usage of the Vula and WebStudies systems at UCT and US. Five factors that encourage C/LMS usage for students are identified. In short, (1) the positive perceptions of the usefulness and (2) the ease of use should be supported by (3) practical usability of the system, (4) constant availability, accessibility, relevance and (5) clarity of purpose on the part of the lecturers.

In addition, interviews with UCT and US lecturers suggest that (6) a supportive environment in the form of administrative and (7) technical support encourages C/LMS usage. Administratively, UCT and US lecturers do not have to spend their valuable time on tedious administrative task to enrol students into their e-Classrooms, as learners are enrolled centrally into the appropriate courses on the C/LMS. Technically, computer laboratories have full-time personnel who look after facilities, ensure that they are maintained, and who assist learners when they have operational difficulties. Further, the helpdesk services are reported to be very efficient in both institutions. Limitations in respect of these factors, on the other hand, play a negative mediator role to C/LMS usage. The association of lower motivation and limited patterns of C/LMS usage among lecturers at CPUT and at UWC (to a lesser extent) support this argument.

A critical discussion of the findings follows in section 5.4.

5.4 Critical Discussion of Findings

This section discusses the findings, reflecting on learning as a collective objective of the e-Learning activity system (as per the ActAD framework in Figure 9). Reference is made to the conceptual work of learning and pedagogical paradigms. The approach is to view e-Learning and the use of a C/LMS beyond institutional differences. Instead, varying patterns between institutions are seen as outcomes of different mediators within a collective system of e-Learning. Linkages, causalities and implications of the mediators and the resultant outcomes, therefore, are critiqued and explained.

In effect the ActAD framework suggests that, whilst usage of a C/LMS is influenced by positive mediators, poor usage is an outcome of a negative interplay between the actors, activities and the mediating factors. The findings in section 5.3 outline a specific trend in the patterns of C/LMS adoption and usage patterns between four universities. The presence of the positive mediators of usage at UCT and Stellenbosch is supported by positive patterns of C/LMS usage in these institutions. Similarly, there are limitations in these factors at CPUT and UWC with poor C/LMS patterns. Whilst C/LMS uptake is high at UCT and Stellenbosch, usage statistics still do not reflect a 100% rate of uptake and usage. Similarly, despite the limiting factors at CPUP and UWC, there are still a fair number of educators who continue to use a C/LMS. Further, a fair amount of similarities in lecturer perceptions about the usefulness of a C/LMS are standard across the four institutions. That is, there is a mixture of positive and negative perceptions across all four universities. Therefore, differences in circumstances and similarities in perceptions need a further scrutiny for a deeper insight into the subject.

5.4.1 Causal Linkages between e-Learning Mediators

Common linkages between the outcomes of mediating factors of C/LMS between institutions are outlined in Figure 24, and explored in sections that follow.

Figure 24: Overlapping trends in the mediating factors of C/LMS usage

Causal linkages between mediators of e-Learning in Figure 24 are viewed from the 'object transformation' phenomenon of the ActAD framework. The primary focus in the ActAD framework is on work processes (and information flows between) by the professionals (or e-

Learning community of practice) within an activity (the teaching and learning activity in the case of this thesis).

The goal of a collective work activity in the e-Learning activity system is not only dependent upon the presence or absence of mediators. The ActAD framework further suggests that the work process should take place (Figure 9). The work process includes an object of the activity, '*a transformation towards an outcome, and the outcome*' (Mursu et al., 2007: 7). The object is more than just the changing of one thing into something different. It is a purposeful undertaking by the actors to create a transformation process towards achieving the intended outcome (ibid.). An actor has a goal, tools, colleagues and rules when he/she is working on transforming an activity into the intended outcome, hence the activity system is understood as a collective set of activities carried out to achieve a common purpose (Figure 9).

Given the systematic nature of the activity system, a relative fit between the elements of a work activity is assumed (Engeström, 1987). This relative fit is termed the 'mode of operation' which, as the activity advances in its transformation towards the intended outcome, goes through imbalances and contradictions within an actor, and between actors. Contradictions are temporary and they are necessary because, as they are addressed, the work activities and the transformation process are strengthened, which in turn leads to a better outcome (ibid.). The transformation process, therefore, is not immune to mediator influences, and it is certainly not immune to multiple contradictions. The findings, including the emergent contradictions between the mediating factors, are outlined in Figure 24 and elaborated in sections that follow.

5.4.1.1 One C/LMS brand, contradictory outcomes in two institutions

On the first factor (system usability) in Figure 24, a specific brand of a C/LMS (WebCT) has inhibiting functionality failures in one institution (CPUT), but works efficiently in another university (Stellenbosch). For example, setting or even invigilating tests on WebCT is described as disastrous at CPUT, because the system could fail at any moment (CPUT, M1–R4). It is also described as 'not easy to use' (CUPT, CU – R8), and that the response time can be very slow (CPUT, C1-R11 and CR-R30). On the contrary, Stellenbosch lecturers describe the same system as 'quite simple' and 'user friendly', though 'Like any other system, you must first learn and familiarise yourself a bit, but after that it is relatively

easy to use' (US, W1-R8). It is also seen as '…a very easy way to communicate with students. It also opens up certain possibilities, but mostly, improves my communication with students' (US, L1 – R6).

This observation demonstrates an element of doubt to normative assertions by lecturers and students at CPUT that the problem is system based, simply because of different experiences at Stellenbosch. On closer examination, however, the annual report of the Stellenbosch e-Learning administrative unit, the Center for Teaching and Learning (CTL, 2009) that more that 5 179 function related queries were lodged to the support unit over the 2009 academic year. Whilst specific details of queries were not made accessible to the researcher, the annual report states that 'Webstudies support continued in 2009 and the administrative staff handled several phone calls and e-mail queries on a daily basis'. The statement 'support continued in 2009' implies a continuation of a trend experienced in previous years. On this statistic alone it is clear that the number of queries could have been lower if the system was problem free. Therefore, it is logical to explain positive user experiences of WebStudies to sound prevention and efficient damage control measures by the implementing unit and the network support (helpdesk) teams. The statements by the lecturers that the IT helpline at Stellenbosch University is impressive, and that 'you just phone through' and use 'remote access' to work on your computer, fixing the problem fast' (US, W1-R14), supports this argument.

The argument in the introductory part of this section is that the transformation process under the ActAD framework is not immune to negative mediation as well. Whilst other actors with the e-Learning activity system only have to deal with access issues, matters of resistance to change and literacy limitations, institutions and users with troubled network systems and poor user support are more hindered from transforming their goals into desired e-Learning outcomes. A lesson for the negatively affected universities is that, until an inefficient system can be replaced, it is possible to control defects through sound management and efficient user-support initiatives.

5.4.1.2 Four institutions, two contrasting sets of usage outcomes

On the second factor (system usability similarities) in Figure 24, it is stated that usability failures are a major limitation to C/LMS usage at CPUT. The puzzling point in the findings is that UWC is a different institution, and is using a different C/LMS called KEWL, but are

experiencing a similar challenge. As a result, both institutions are experiencing low rates of C/LMS usage. The paradox in this instance is twofold. Firstly, only these two out of the four universities are experiencing this challenge. Secondly, that the other two universities (UCT and US) have the highly usable systems, and high rates of C/LMS usage. So, the findings are showing a case of two possible scenarios. It has already been established in section 5.4.1.1 above that the problem may not be the system entirely and that, if it is, sound management and efficient user-support structures act as strong positive mediators.

Findings in the case of CPUT point to organisational limitations (due to the politics of institutional mergers) as the problem. For example, different departments are shifting responsibilities between themselves. The e-Learning unit '*seems to think that the problem lies with the network which is managed elsewhere by others, who do not think the problem is with their section but with the other team, now how can you solve that without first bringing these people together*?' (CPUT, J1 – R22). Long-serving employees at CPUT '*think the problem is one of those merger related challenges… because everyone points the problem to the other person, and you need these departments to be functioning as a unit*' before you can get things to function systematically. To problem at CPUT, therefore, is more organisational (managerial) than technical. To support this point, it was even impossible for the author of this thesis (who is an employee of CPUT) to obtain basic but reliable statistics about C/LMS usage in this institution.

A similar situation was experienced by the author at UWC for different reasons to those of CPUT. The e-Learning project, including the development of the KEWL C/LMS at UWC, was initiated, driven and strongly dependent on a single 'champion', Professor Derek Keats, whose departure left a management vacuum in the unit (Mlitwa, 2008). The fact that the employees of the unit did not know who the author could interview, and also did not know where the sought information could be found in this institution, illustrates this point. This form of management operational shortfall inhibits linkages between other mediating factors, with a negative impact on the transformation process in the e-Learning work activity system in both institutions. Therefore, it is advisable for the negatively affected universities to attend to managerial limitations, revisit their system choices, to strengthen IT infrastructure and the user-support initiatives.

5.4.1.3 Students drive C/LMS usage at UCT, but lack such impact at CPUT.

On the third factor (impacts from environmental pressures) in Figure 24, the summary of findings indicates that students drive even the most reluctant lecturers to use a C/LMS at UCT (UCT, H1-R5; UCT, N1-R13). At CPUT, however, students who strongly want a C/LMS to be used lack such an impact.

An important point about the elements of transformation and about mediators is that they are part of a collective system of goals, actors and activities (Engeström, 1987). None of the system elements operates in isolation (Mursu et al., 2007). Pressure that students exert on the lecturer is part of the mediators referred to in Figure 9, as a social mediator. Like other factors such as rules (policies and strategies), tools, skills etc., a social mediator works in conjunction with other factors, in favour or against a collective goal.

It has been argued in sections 5.4.1.1 and 5.4.1.2 that the technical infrastructure, sound management, efficient skills and technical support systems exert the stronger mediation influence in the transformation process. The situation at CPUT and UWC is that the force of negative mediators seems to be stronger, with an overriding effect on pressure from students. The trouble is that a contested interplay between the mediators is not only just between these three stronger mediators and the student force. There are other negative mediators at play. In the case of CPUT they include a lack of interest and resistance to change among some lecturers (CPUT, C1-R7), limited background and experience (CPUT, M1 -R2; CPUT, C1-R9), work overload and time limitations for lectures (CPUT, M1-R7), and the issues of resistance to change (CPUT, C1-R7), among other factors.

So students' pressure alone cannot be a panacea to drive C/LMS usage – regardless of circumstances or environment. Other factors play an equally strong, if not a stronger, role in the mediation of a transformation process in the e-Learning work activity system.

Therefore, it is advisable for initiatives to advance the adoption and usage of a C/LMS in university settings, to be conscious of all possible mediators of system usage. In particular, careful attention should be paid to managerial limitations, system choices and to the strengthening of infrastructure and user-support initiatives.

5.4.1.4 Disagreements on C/LMS relevance to teaching

On the fourth factor (perceptual similarities, different practices) in Figure 24, it is noted that

lecturers tend to agree on C/LMS usefulness, but disagree on the detail of usefulness and on the relevance of the system to teaching (and learning). All 21 interviewees state that a C/LMS is important, with one side of the spectrum supporting the usefulness of the system to teaching and learning, whilst others viewing a C/LMS as an important logistical tool. This point is discussed in section 5.3.2.2 of this chapter.

Further, pedagogy assertions differ between lecturers within institutions. Different lecturers make indirect inferences to the behaviourist, and to the constructivist modes of instruction assertions about e-Learning. Behaviourist sentiments include descriptions of the preferred uses of a C/LMS, either as a '*place where students can get hold of your lectures, your slide shows, their tests, they can post staff for you, you can post back*…' (CPUT, C1-R16), or a '*good interface between an academic and a student/s… to present staff that they need to know in a fairly structured way*' (CPUT, J1 – R8). A C/LMS is also seen as a means '*to give students access to articles and study materials that one would otherwise send them to the library*' (US, L1-R7), or in the case of UCT lecturers, '*to put readings and references and so forth, onto VULA or on the Website*' (UCT, A1 – R4).

On the constructivist front, lecturers argue that students cannot '*just understand and grow wiser, by just looking at the materials*' (UCT, K1 – R6), and that it is not '*about imparting facts and more information. To try and get students to understand and be sensitised about concepts, takes a lot of effort on the part of the lecturer*' (UCT, K1 – R7). Others emphasise a need for flexibility, where a learner is able to learn as they go, thereby describing C/LMSs that are not integrated with Web2.0 multimedia and mobile technologies as inadequate (CPUT, M2 – R14).

In the light of different pedagogical stances, C/LMS usage patterns can be expected to follow different pedagogical stances. A contraction in this instance, however, is that C/LMS usage patterns by lecturers are predominantly similar. That is, all 21 lecturers in the sample, from both ends of this pedagogical debate, are using WebCT (CPUT), Vula (UCT), WebStudies (US) and KEWL (UWC), to present notes and to communicate with their students. This paradox is typical of what Laurillard (2008) refers to as shortsightedness in teachers and lecturers' conception and view of 'computer assisted learning'. A common mistake is that educators are looking at technology first, in a sort of 'I have technology, therefore I must use it' sort of sense. The temptation then is to look at what a technology has (in terms of the features) and try to find something for which it may be used in education. This way, lecturers end up complying with a technology rather than to get to the core of e-Learning, which is to support

learners to learn. In the ActAD, 'object-transformation' sense, resultant e-Learning activities would fail to transform the goal of the process, into an outcome. If learning is at the centre of e-Learning processes, then the use of a C/LMS tool should yield a transformation of e-Learning activities, into desired outcome. The latter refers to a successful facilitation of different styles of learning, across pedagogical paradigms. In this respect a useful approach is to start by understanding 'what it means to learn' and then ask how technology can help in addressing this problem or need. The starting point is to understand different styles of learning (Gardner, 1983) and ask, 'How can a C/LMS be used to facilitate various learning capabilities and styles?' Using Koshmann's (1996) four paradigms of viewing teaching over a technology platform, cynicism against the relevance of a C/LMS in teaching is disputed in this thesis. The four paradigms, as per the proposed framework in Figure 5 are:

- Computer assisted instruction (CAI);
- Intelligent tutoring systems (ITS);
- Logo-as-Latin, and
- Consumer support collaborative learning (CSCL).

The paradigms are used to demonstrate how a C/LMS can be used to support a direct mode of instruction (behaviourist pedagogical paradigm), guided learning (cognitive pedagogical paradigm) and discovery learning (cognitive and constructivist pedagogical paradigms) in the following passages.

5.4.1.4.1 Using a C/LMS in the CAI paradigm

Within the eight styles of learning (section 2.3.2 in Chapter Two), a 'linguistic learner' is stronger at (and learns better by) identifying, memorising and recalling words, statements and facts (Gardner, 1999). Presenting factual information in a physical or virtual classroom environment would support this learning style. The Computer Assisted Instruction (CAI) paradigm outlines the use of computational technology to enhance the direct mode of instruction (direct mode of instruction). Under the CAI, a C/LMS or similar technology may be used either as an individual or a group (social) instructive tool to support the learning style of a 'linguistic learner'. The use of an overhead projector and presentation slides to deliver a lecture in a physical classroom is an example of a social (group) instructional tool. When uploaded into a C/LMS for access and use by individual learners, these become

individual instructional tools. The same principle applies to the use of a networked system as a content repository medium. Educators in South African universities, according to the findings, are using a C/LMS within the CAI paradigm to support a direct mode of instruction. In a somewhat cynical way, though, a number of lecturers at CPUT and UCT dispute the educational value of C/LMS usage under this mode. This group of lecturers considers their C/LMS usage to be merely logistical, with no teaching or learning benefit. It simply adds logistical efficiencies, helping you (a lecturer) to do more with less and communicate effectively, as well as improve the way you store and share information with your students.

It is arguable, nevertheless, that even the 'cynics' who constantly and systematically use a C/LMS to communicate and deliver valuable content over a C/LMS could be supporting the 'linguistic-learner intelligence', without realising, admitting or even trying to do so.

In addition to the behaviourist (direct instruction) mode of using a C/LMS (as outlined under the CAI paradigm), a C/LMS also offers useful teaching solutions in the ITS paradigm.

5.4.1.4.2 Using a C/LMS in the ITS paradigm

The Intelligent Tutoring System (ITS) paradigm outlines the use of computer technology as an information exchange tool, mostly within the 'guided learning' mode of instruction (Figure 5). Under this paradigm, a C/LMS is used to guide learners or for learners to discuss learning experiences. In this instance, learners take an active (often independent) part in the learning process, with the lecturer acting only as a guide, a tutor and a mediator. As a mediator, the educator can use a C/LMS to monitor and guide discussions, or even invents and initiates discussion topics. Under the 'guided learning' mode of instruction, therefore, even a simple process of solving a student's academic question over an online medium guides and mediates some element of learning in a student, and is therefore, a teaching function.

Whilst people differ in terms of their learning strengths, abilities and styles, none of the eight learning styles works in isolation from each other (Armstrong, 2010). In this instance a linguistic learner, who would excel under direct instruction, would also need efficient supply of information to memorise, to recall, and would also need guidance. A C/LMS as an efficient communication tool under the 'guided mode of learning', therefore, would also support the linguistic learner (ibid.). Other styles of learning would also benefit from the use of a C/LMS under the ITS paradigm. The second learning style, the logical (mathematical)

learner who learns better with cognitive data and numbers (Gardner, 1983) would equally need educational information and guidance. Similarly, the spatial learner (who learns better from seeing images and pictures), and the musical learner, who learns better from hearing sounds, both can benefit from the use a C/LMS to access audio and image information, and from online guidance. The interpersonal learner, who learns better by interacting and observing others, would benefit from online interaction. The intra-personal learner, who learns better when working in isolation, would sit quietly in front of a computer and interact with a lecturer or colleagues whenever there is a need. The naturalist learner would rather be in the open field interacting with nature. Similarly, the kinaesthetic learner would learn better by physical practice and by observing others. So, whilst the last two learning styles would benefit from the guided mode of learning, a C/LMS would play a minimal role in their learning styles.

Noting, however, that being a kinaesthetic learner does not mean that you are not a logical (mathematical) learner, a spatial learner, a linguistic learner or any other style at the same time, and that a learning style is supported by other learning strengths within an individual, dismissing the use of a C/LMS in supporting naturalist and kinaesthetic styles of learning would be erroneous. For example, it is possible that information supply over a C/LMS would further enhance other aspects of these learners.

All 21 lectures in the sample said they are making extensive use of communication tools to provide and exchange information with learners over C/LMSs. Learners in one of the universities (UCT) say they are more satisfied with the use of the Vula chat-room facility when a lecturer actively participates in discussions forums. On the same point, students in other universities strongly recommend more lecturer presence online, with UWC students requesting an online tutorship system. Using a similar argument, UCT students recommend the online presence of tutors and lecturers so that they can be accessible on demand – to the extent that attending lectures could become optional. An ideal C/LMS, according to UCT students, is the one which is relevant, always functional and constantly available. It must contain all the necessary reading materials so that students do not have to search the library or online sources for books and other content, and that lecturers and tutors should be available on demand, and round the clock. In this respect, some form of a ‘guided mode of learning’ is implied. Further, since communication is central to all forms of instruction, guided-learning is seldom used in isolation. It is often present within and across the instructivist

(direct-instruction) and constructivist modes of instruction. For a C/LMS to offer the 'guided-learning' forms of instructional solutions, however, requires lecturers and instructional designers to make deliberate efforts to prepare their e-Classroom environments to fit this purpose.

As it was demonstrated under the CAI paradigm that a C/LMS improves teaching and learning in the behaviourist (direct) mode of instruction, an argument that a C/LMS improves the guided learning mode of instruction within the ITS paradigm is clearly articulated in this section. Under the Logo-as-Latin paradigm, a C/LMS is not only used as a communication tool and to guide learning, but also to foster discovery learning.

5.4.1.4.3 Using a C/LMS in the Logo-as-Latin paradigm

The use of a C/LMS to support constructivist learning appears more frequently in lecturer interview transcripts and e-Learning literature used in this thesis. As reflected in section 5.4.1.1, however, constructivist claims are not backed up by usage evidence among the purporting lecturers.

The Logo-as-Latin paradigm outlines the use of educational technology mostly as a tool and aid for knowledge construction (Figure 5). Under this paradigm, a C/LMS is designed and used in a manner that enables discovery learning. As a theory of learning, discovery learning builds on the assumption that people learn better if they discover knowledge on their own than when they are taught (Bruner, 1967). Discovery learning, therefore, describes the process whereby a learner discovers knowledge on her own, and independent of the lecturer, time and location (Taylor, 2006). Because of this component, a mobile component is assumed (O'Malley et al., 2003).

The appropriateness of a C/LMS in teaching under this paradigm can be explained in terms of the learning styles the instruction would support. People who are stronger on the logical-mathematical intelligence (logical learner) and intrapersonal intelligence (intrapersonal learner) have stronger cognitive capabilities (Armstrong, 2010). They find room to exercise their cognitive strengths, leading to better outcome when learning under discovery, experiential and mediated environments.

Relevance of a C/LMS as a teaching instrument under this paradigm is evident when it is used as an individual or social-knowledge construction tool. As an individual construction

tool, a learner plays an active role in exploring information and knowledge in his or her virtual space – to discover new knowledge. A lesson for educators and instructional designers, however, is that they should provide for this component in their instruction over the e-Classroom. Because of the 'independent' and the 'anytime and where' assumptions, a C/LMS is linked with mobile devices so that it is accessible whenever it is needed. Further, prioritising synchronous and asynchronous communication tools, creative exploratory exercises, self-assessment tools as well as system linkage with unlimited sources of knowledge would support the facilitation of discovery learning on the system.

Whilst communication features were considered adequate to enable guided and collaborative learning in WebCT (CPUT), KEWL NextGen (UWC), Vula (UCT) and in WebStudies (US), the tools are not fully utilised for this purpose. To confirm the adequacy of a tool, but shy away from using it may be understandable in case of practical hindrances such as limited time, lack of skill or network failures, but turning around and use baseless claims to dismiss its relevance in teaching however, seems contradictory and therefore, intellectually suspicious.

5.4.1.4.4 The C/LMS and the CSCL paradigm

The Computer Support for Collaborative Learning (CSCL) paradigm is an ICT extension of the constructivist approach to teaching and learning. It builds on constructivist assumptions that learners draw on prior experiences and their environment to interpret and evaluate knowledge, and ultimately contribute in the construction of new knowledge (Figure 5). Under this paradigm a C/LMS is designed and used in a manner that enables collaborative learning. Persons who are strong either on 'spatial intelligence' (spatial learner), 'musical intelligence' (sound and musical learner), 'interpersonal intelligence' (group person or interpersonal learner) or on 'naturalist intelligence', are stronger in drawing from others. They should learn better under collaborative projects (Gardner, 1983; Armstrong, 2010). Whilst group projects and multi-stakeholder participative tasks are enabled and encouraged in a C/LMS under this paradigm, collaborative learning (according to students' views) is dependent on, and informed by, an appropriate teaching style and the resolve of the educator to initiate this form of learning.

The findings suggest that although collaborative learning tools exist in Vula (UCT), WebCT (CPUT), WebStudies (US) and in KEWL (UWC), the potential of the facilities is not fully

exploited by lecturers. C/LMSs are predominantly used as a storage and communication medium in the four universities. Since the use of C/LMSs depends on teaching goals and particular teaching styles, an unqualified recommendation towards collaborative learning cannot be made in this thesis. Instead a vigorous debate on the linkage between educational technology and pedagogy, which will then inform teaching stances, is encouraged. The work activity framework developed in this thesis may be employed further in this process to simplify systemic relations between a C/LMS and various pedagogical stances.

5.4.1.4.5 Conclusion on the appropriateness of a C/LMS in teaching

The controversy in the summary of findings in the fourth factor (perceptions on the appropriateness of a C/LMS in teaching) in Figure 24, is that all lecturers who where interviewed (across the four universities) said a C/LMS is important in education, but disagree on its relevance to teaching. There are those who see a C/LMS as a useful teaching and learning instrument, and those who dispute its relevance in teaching (and learning), and see it as a mere logistical tool. Where the academic value of a C/LMS is questioned, motivation for usage is not likely to be high, and in limited cases of usage, pedagogical considerations would be rare. As a result the impact of the activity in strengthening the transformation process within the e-Learning activity system is weakened. To this effect, the inter-pedagogical framework in Figure 5 (Chapter Two) was used to interrogate the logic of disputing the role of a C/LMS in teaching in this section. It is then demonstrated under the CAI, ITS, Logo-as-Latin and the CSCL paradigms that a C/LMS is a potent teaching (and learning) tool, usable to enhance different styles of learning across pedagogical paradigm. Success, however, depends on a deliberate undertaking by educators and instructional designers to develop and implement e-Classroom towards these ends.

Arguments in this section expose lecturer cynicism on the relevance of a C/LMS in teaching, as logically unsound. On the balance of existing arguments, the sceptical view is dismissed an intellectually suspicious in this thesis. In line with this conclusion, dissatisfied students are calling for a prescriptive and compulsory from of C/LMS usage in academia. However, without appreciating the value of a C/LMS in teaching, it is questionable whether compulsory usage would yield a pedagogically sound e-Learning practice in South African universities. To this effect, an educational technology and pedagogy discourse should be vigorously

encouraged.

5.4.1.5 Proprietary and OSS-based system formats in separate institutions, but similar operational challenges.

Deciding on the type and brand of an IT system for programmes in public-based environments such a learning institution is always a complex process (Bridges.org, 2005). It involves deep and often divisive issues of relevance to needs, costs, software factors (ibid.) and usability, system sustainability and support, among other factors (e-Learning Engineering, 2006). An important but often ignored factor is that a system should be easy to integrate and interoperate with other existing systems in an organisation (e-LearnSpace.org, 2010).

Weighing of these factors often informs a final decision on whether to use a proprietary or an open-source software-based system (bridges.org, 2005). Factors affecting this decision vary according to the context, but cost, relevance and system support considerations are the most important factors because they inform the sustainability of a system that is finally adopted (Mlitwa, 2008).

Important considerations among local universities, such as CPUT, were on the relevance, ease of use and availability of support (Smit, 2010). Whilst philosophical convictions of the founding champion of the KEWL system on OSS played a role in the choice of the current home-grown system at UWC, the development was more coincidental than planned (Keats, 2003). KEWL development is described a by-product of an internationally funded educational research project that, due to its promising success, was continued into the current system after the project term had lapsed (ibid.). Following operational frustrations with a proprietary system called WebCT before 2007, the choice of Vula at UCT on the other hand, emerged as a deliberate collaborative effort by an international community of universities within the Sakai project. Emphasis on the Sakai project is placed on the educational needs of the institution and usability as sustained by collaborative support from participating stakeholders in the project (Sakai.org, Online). The hope after the selection of a system is that it should meet the operational expectations of its adopters. In this respect the question can be asked as to whether there is a difference in terms of functional efficiencies (as a return on investment) between the proprietary and an OSS-based system.

The fifth factor (Impact of software choices) in Figure 24, outlines a thought-provoking co-

relationship between user experiences under a proprietary system (WebCT) used at CPUT, and under the OSS-based system (KEWL) at UWC.

On this point, findings in the case of CPUT and UWC point to organisational limitations as the problem, and not the structure of the system (this point is elaborated in section 5.4.1.2 above). In effect, positive developments in a collaborative OSS environment in the Sakai project (UCT) and on the proprietary system, WebStudies at Stellenbosch, suggest a lack of functional differences between OSS and proprietary software systems.

Therefore, ensuring a healthy IT infrastructure (that is frequently serviced and upgraded) as well as to ensure sound management of e-Learning units and efficient user support systems, remain a logical conclusion.

5.4.1.6 Resistance to change and limited skills "make different impacts" on C/LMS usage between institutions

In the sixth and final factor (resistance to change, limited skills for user, but different impact on system usage) in Figure 24, the summary of findings suggests that skills limitations and resistance to change among lecturers are a common problem in all four universities. A lack of interest and willingness by lecturers (CPUT, C1-R7), not having a broad computer background (CPUT, M1-R2; UWC, K1-R4), and with some lecturers fearing that perhaps the system may be too difficult to even try (UWC, L1-R27), are cited at CPUT and UWC. Similar limitations are cited at UCT and US, but in this instance, resistant lecturers are making alternative arrangements to ensure system usage in their courses. At UCT for example, an elderly professor states '*a recommendation, taking a personal example, would be to pass on the notes to someone who then does that for you, that would make it so much easier*' (UCT, H1-R13). On the same point a US professor states: '*I think what we have done in our department, which was to appoint one person to put things up for lecturers, could help*' (US, L1-R9). Because lecturers in all four institutions had declared belief in the importance of a C/LMS, it is not clear why the equally concerned lecturers in the historically coloured and historically under-resourced university (UWC) as well as in the former Technikons that merged into a University of Technology (CPUT) are not making alternative arrangements towards C/LMS usage at CPUT and UWC.

Further, a negative co-relationship between system usability failures, related frustrations with these system functionality challenges among lecturers and learners on the one hand,

and C/LMS usage patters is apparent at CPUT and UWC – which were the two severely affected institution. It appears that the status quo has a negative impact on interest among the already reluctant groups of lecturers in these institutions. In this case, the likelihood of making alternative arrangements to use the system becomes minimal.

5.5 Conclusion of Chapter Five

The aim of the thesis was to understand, describe and explain the factors that hinder or encourage C/LMS usage by lecturers in South African universities. E-learning and C/LMS usage, however, involves both educators and learners. So, learning about C/LMS usage by educators requires some background insight from the intended beneficiaries of the e-Learning process, the students.

Using qualitative research methods under the interpretivist paradigm, interviews were held with students and lecturers at CPUT, UCT, US and UWC. The literature on pedagogical paradigms, on computer assisted learning and the styles of learning were used to frame a conceptual context. In addition, the activity theory was used to develop an operational framework, the ActAD framework (Figure 9) of analysing the adoption and use of e-Learning systems in Universities. Based on the key assumptions of the activity theory of Engelstrom (1987) and Mursu et al. (2007), the ActAD framework views IT and information systems projects as a work activity system of collective activities. The work-activity system consists of the actors (who may be individual, groups, or entities), activities, goals, rules, tools and the environment, which are joined together by the pursuit of a common purpose. The framework helped interpreting different elements and processes of e-Learning under these terms. A common purpose in the case of e-Learning, for example, is the facilitation of different styles of learning through the use of a C/LMS. The full list of actors, activities, goals, mediators and outcomes for this study are outlined in Figure 9.

It is assumed in the ActAD framework that the interplay between enabling and inhibiting mediators in the activity system determine (mediate) the quality of activities, and the final outcome. The mediating factors, therefore, are independent variables. Activities and outcomes are the dependent variables. The independent variables are then used as the themes of discussion. This format is used in the collection of an analysis of data, as well as in describing (section 5.3) and discussing (section 5.4) the findings. In this respect, findings are presented in the issue-based rather than the institution-based format. For example, the

mediating factors are presented as issues, and observations are made as to how a respondent reacts to, or is affected by, the issue. Tensions were then interrogated further for explanations.

External factors outside the identified mediators in the ActAD framework have also emerged in the findings. For example, the four universities that were selected had separate cultural contexts and socio-economic development backgrounds. The University of the Western Cape as a historically and predominantly still a coloured university (like most non-white universities) for example, shares the legacy of under-development and limited resources as opposed to the historically wealthy English and Afrikaans universities of Cape Town and Stellenbosch. The former Technikon institution on the other hand, combines a historically coloured and under-resourced Technikon (Pentech), and a historically White and wealthy Technikon (CapeTech). A strange pattern is that both a University of Technology and a historically black university are sharing similar development challenges, whist the two historically white and wealthy institutions (UCT and US) share a common pattern of progress.

5.5.1 Contribution to Scientific Body of Knowledge (e-Learning Literature)

The findings offer invaluable insight into the field of e-Learning, in a number of ways. Whilst empowering contribution to the practice for educators, instructional designers, e-Learning administrators, policy makers and researchers are elaborated in respective sections of chapter six, an account of how the findings reflect to the literature on e-Learning is worth highlighting in this section. The findings contribute to the field in two ways. At the first instance, documented knowledge is strengthened by patterns that confirm existing knowledge. At the second instance, new developments that diverge from held conceptions are adding new insight, and ultimately, contributing to the growth of knowledge in the field of e-Learning.

A generally held view in the field of e-Learning is that technology offers numerous solutions to education (Laurillard, 2008). At the very least, ICT such as C/LMSs for example, improves efficiencies in teaching and learning (Bridges.org, 2005). Learners and educators in the four universities were found to support this school of thought. Literature by Davies (1989), DeLone and McLean (1992) among others however, add that positive perceptions on the

usefulness of a technology are not enough to guarantee adoption and usage. Perceptions on the ease of use of a technology (Davies, 1989), including self efficacy (Bandura, 1991 & 1994) or perceptions on one's own ability to use a computer (Compeau & Higgins, 1995), as well as the quality and functionality of a technology (DeLone & McLean, 1992), determine the success of a system and its usage. Eom et al (2006) add self motivation in this list. The activity theory based ActAD framework also suggests the presence of positive mediators in any work activity, i.e. the e-Learning activity, to support activity and ultimately yield desired outcomes (Mursu et al, 2007).

That educators and learners who are confident with computers in universities with adequate resources were found to be using C/LMSs the most, confirm and strengthens this body of literature. Poor technology facilities as well as limited skill and motivation – associated with poor C/LMS usage patterns at CPUT and UWC on the other hand, further confirm that system usage fails when these enabling factors are missing.

Exceptional cases where lecturers within well-resourced institutions, who are also skilled and motivated, shy away from the use of C/LMS at UCT and Stellenbosch; and when lecturers in institutions with limited facilities defy limitations to use C/LMSs at CPUT and UWC, held literature foundations are challenged. A lesson in the case of UCT and Stellenbosch is that despite self-motivation, skill and perceived potential of the system, emergent external factors can be stronger than the known positive re-enforcers, to hinder system usage. That C/LMS usage is time consuming, that it tends to discourage students from attending lecturers, and finally, that it tends to hinder the skill and drive to use traditional sources of information among students – have emerged as serious factors against C/LMS usage, even in well resourced and supported universities. This point alone, offers a new insight, and a challenge to held conceptions of technology adoption and usage in the field of e-Learning. Further contributions to the body of knowledge, including account on the findings relative to the theories of learning are discussed in chapter six.

In effect, the final chapter (chapter six) evaluates the study, summarises the findings and recommend the way forward for practitioners, and with thoughts on further research.

CHAPTER SIX: CONCLUSION AND EVALUATION OF STUDY

6. INTRODUCTION

This chapter summarises the study, reflecting how the research problem, the objective and a research question were addressed. Recommendations are offered, together with the evaluation of the thesis - to support the conclusion of the study.

Each point concludes with an account of how the findings and recommendations contribute to both the scientific body of knowledge, and the community of practice. The outline of this chapter is presented in Figure 25.

Figure 25: Outline of Chapter 6

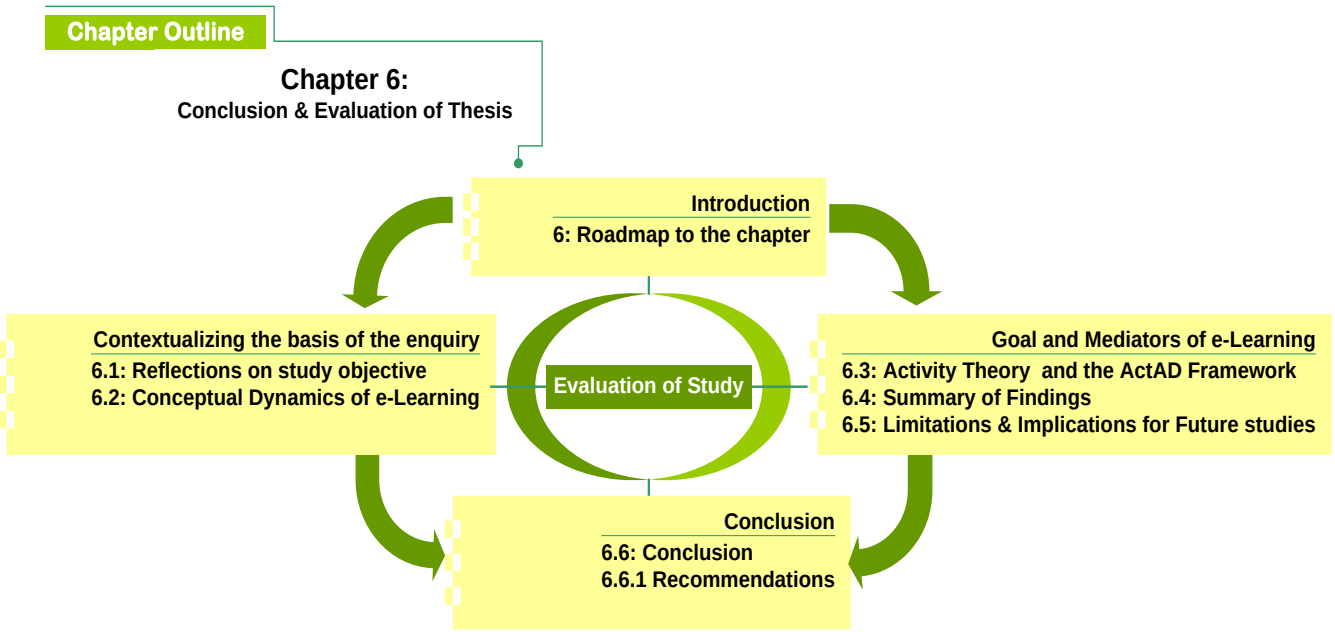

Figure 25: Outline of Chapter 6

6.1 Reflections on Study Objective

The research problem was informed by literature on e-Learning, and findings in background studies. Whilst educators acknowledge the usefulness of e-Learning systems in education, clarity on the practical details was lacking (Mlitwa, 2005; America, 2006). Lecturers in South

African universities were divided on the practical value of a C/LMS in teaching, and on how it can improve learning experiences in background studies (Czerniewicz, et al, 2007). Further, despite the positive perceptions, C/LMS usage within faculties across universities remained minimal in that fewer lecturers were using the systems, and for limited purposes (Mlitwa, 2005; America, 2006). Uses were also inconsistent in terms of frequency and spread of use in a department or faculty within an institution (Mlitwa, 2005; Czerniewicz & Brown, 2005). However, explanations to limited usage and on whether the uses were adding value (and the type of value) to teaching and learning remained inexplicable. With non-usage, students could not access the benefits of e-Learning in their academic programmes. Unless the positive perceptions are supported by practice, massive investments in developing and acquiring educational C/LMSs within universities are also hard to justify.

6.1.1 Contextualising the Problem (to Inform the Evaluation)

Until the problem is clearly understood, efforts to address it and to improve the value of C/LMS usage in teaching and learning are likely to follow an uncertain route, with risky outcomes for financial principals and intended service recipients (students). On this basis, an enquiry was initiated to investigate the factors that affect the use of C/LMS in teaching and learning programmes in South African universities.

The objectives of the study were two-fold. At an operational level, the goal was to develop insight that will contribute towards improving the practical application of learning technologies in teaching and learning at tertiary institutions. The intention was to empower curriculum planners, educators, policy makers, learners, system administrators and developers, with insight to improve e-Learning activities. The second goal was to contribute in the scientific body of knowledge, by developing a theoretical framework for investigating and analysing e-Learning practices in universities.

It is against this background that thesis will be evaluated in this chapter.

6.2 The Conceptual Dynamics of e-Learning

The opening section of Chapter 2 presents the problem of divergence in interpretations of e-Learning concepts among educators. In background studies, lecturers generally described a C/LMS as useful, only to disagree on how it can be used to facilitate learning. On the pedagogical front were claims that C/LMSs offer educational value only when used within

the constructivist paradigm. In this respect, constructivists have not only been questioning the legitimacy of a behaviourist mode of instruction in facilitating learning, but also dismiss as “utterly ludicrous” (Mlitwa & Nonyane, 2008), any linkage of a C/LMS with direct knowledge transmission methods. In effect, behaviourist uses of a C/LMS are not only frowned upon, but discouraged in constructivist accounts of e-Learning. Another point of contention in Chapter 2 has been a dismissal of the value of computer facilities in teaching, with cynics describing a computer as nothing more than a logistical tool (at best) or a tool to manipulate learners (at worst).

The problem with a lack of clarity on the practical aspects of implementing a C/LMS is that it discourages usage. In this respect, C/LMS usage patterns were inherently incoherent and impotent in South African universities (Mlitwa, 2005; America, 2006; Czerniewicz, et al, 2007). Of notable concern to the author was that in countries where usage was high, a positive impact of C/LMS usage on learning was lacking. For example, concerns over a lack of impact on current C/LMS uses in universities had been raised in Europe, Canada, the USA and Africa among other regions (OECD, 2005; WEF, 2008; Sangra, 2008 and CCL, 2009). The value on investments onto e-Learning had not been seen in current uses of C/LMSs (Sangra, 2008; Bates, 2009; Smith-Jaggars, 2010). A potent explanation is that in their use of educational technology, educators hardly focus on the critical aspect of e-Learning, which is learning (Laurillard, 2008). As a result, C/LMS usage had become a disjointed series of “laissez-faire” episodes, with intangible impact on learning. Students raised this concern in the patterns of C/LMS usage at CPUT and UWC. Non-linkage of C/LMS usage with pedagogy is evident in e-Learning practices, with dominant uses mainly being the upload of notes, and communication in the four universities. To this effect, lecturers are advised to first articulate clearly “what it means to learn”. They should then use that insight to define solutions they need, and the appropriate uses of a C/LMS in higher education if the benefits of C/LMS usage are to be maximised for learners (ibid).

6.2.1 Learning Should be Central to e-Learning

Despite disagreements on concepts and processes among lecturers, leading authors in the discipline offer useful suggestions on appropriate uses of a C/LMS at universities. A C/LMS should, first and foremost, “facilitate learning” (Laurillard, 2008; Martin et al., 2008; Laurillard & Masterman, 2009) and that it should “improve learner experiences” (Czerniewicz et al.,

2007). For this reason, a C/LMS should support teaching and learning in a manner that prioritises learning. Understanding the meaning of learning before using a C/LMS therefore, should be the starting point of every e-Learning project. The way forward is to acknowledge that “no two learners are alike”. There are different strengths, intelligences, vocational inclinations, and ultimately, different styles of learning (Gardner, 1983; Armstrong, 2010). Therefore, differences in “learning strengths and styles” should always be catered for in e-Classrooms. The relevance of a C/LMS in supporting the behaviourist, the cognitive and the constructivist pedagogical paradigms are offered to support this point in section 2.3 (Chapter 2). The blending of different pedagogical aspects in computer assisted instruction is then suggested in Table 5 and Figure 5 (Chapter 2), and substantiated in detail in Section 5.4.1.4 (Chapter 5).

6.2.1.1 Revisiting a Blended Approach to e-Learning

For a C/LMS to support different learning styles, relevant capabilities, features and programs that can be applied across different pedagogical paradigms, are necessary. Because of different abilities, vocational inclinations and styles of learning, the idea of using a single approach to instruction is critiqued as limiting in this thesis. If learning is central to the use of a C/LMS, then one approach is limiting in that it would facilitate a specific style of learning, whilst neglecting other learning styles. Minimum features that apply to all learning styles are presented in Table 4 (Chapter 2). In this case, a C/LMS should enable open and flexible access to learning materials. It should also facilitate the storage and exchange of different formats of data, easily, speedily, safely and reliably across time and space. It should also be adaptable to new changes, and be inter-operable with mobile devices and the new multi-media technologies, as the very minimum condition.

For a C/LMS to meet these criteria, system usability becomes crucial. Drawing on technology usability studies, the minimalist design (practical simplicity) in a C/LMS, relevance to user needs, efficiency and ease of use are emphasised in Table 6 (Chapter 2). A shortfall in these aspects was a major source of frustration for users, and a strong inhibiter of C/LMS usage in two of the four institutions (CPUT and UWC) in this study. On the other hand, strength in these aspects were associated with high patterns of C/LMS usage in the other two (UCT and US) institutions.

Whilst learning styles differ, each learning strength and style works in synergy with (and not

in isolation from) other styles within an individual. Behaviourist learning strengths for example, would enhance (and be enhanced by) non-behaviourist styles of learning. Platforms that are interoperable between various pedagogical paradigms in a C/LMS therefore, are important. In short, inter and intra-pedagogical approach to e-Learning is offered as both a closing argument in chapter 2, and a major recommendation of this thesis. A contribution of the literature section to the community of practice, and to the scientific body of knowledge generally, is presented in section 6.2.2.

6.2.2 Contribution to Practice and to the Scientific Body of Knowledge

A contribution of an idea is when the members of a scientific community consider the idea to be adding an important value to documented knowledge in the field (Locke & Golden-Biddle, 1997). Therefore, the literature and conceptual underpinnings are viewed in terms of whether they offer insight on the perplexing issues, and on the conceptual tensions raised under the research problem and in background studies.

6.2.2.1 Contribution to the Community of Practice

Literature and conceptual underpinnings clarify the purpose of e-Learning and a C/LMS, as purely to facilitate different styles of learning across different pedagogical paradigms. Clarifying the terms, the purposes of the systems and the educational value in thesis, yields a shared understanding that may inform common practices (Lave & Wenger, 1998) which in turn, contributes toward the development of self reinforcing communities of practice (Wenger, 2006).

Though uptake of e-Learning has grown exponentially in academia in the new millennium, concerns over its limited impact on learning are widespread (Laurillard, 2008; OECD, 2008; CCL, 2009). To this effect, scientific literature is used to clarify the causes. An explanation is that individual educators ask the wrong questions, get wrong answers and use these to implement e-Learning, only to end up with suspicious outcomes. Practitioners are then advised to always start by articulating the meaning of learning, then ask the kind of solutions a technology promises to the articulated problems, and draw on that insight to inform the uses of a C/LMS. That way, C/LMS usage will learner-focused, with a stronger likelihood for a positive impact. In the same chapter, a confusing tension between constructivist and behaviourist accounts of e-Learning is also defused. It will no longer be

necessary to waste energy on trivial debates that try to dismiss a link between a C/LMS and un-preferred modes of instruction. Instead, new insight will contribute towards productive uses of a C/LMS.

Clarity on the characteristics of a C/LMS and on issues of technology usability also offers an empowering insight on the practical dynamics of usage. The diffusion of cynicism on the relevance of a C/LMS in teaching stands out in this contribution. Arguments in background studies were that a C/LMS or any computer technology is not relevant for teaching, but it is merely a manipulative tool and a logistical instrument. Literature on learning styles resolves the confusion in chapter two. It disputes a narrow view of teaching as a single fixed format of activity, where deviation to the norm means deviating from teaching. Instead, teaching is describes as involving a broader array of activities and processes. Under the concept of guided discovery learning, this may include the answering a phone-call or an e-mail from a student who may be seeking clarity about an academic problem, or verifying what they believed they already know. In a C/LMS, teaching may involve a mere monitoring of chat-room conversations, with the lecturer intervening only when there is a need. Providing course content and notes is also a legitimate method of teaching under the behaviourist mode of instruction. With this level of clarity, a cynical lecturer is empowered to start imagining a multitude of opportunities on how to facilitate different aspects of learning over a C/LMS.

6.2.2.2 Contribution to the Scientific Body of Knowledge

At the first instance, clarity on the meaning of teaching, of e-Learning and of a C/LMS enriches the conceptual frameworks in the field. Whilst the terms “e-Learning” and a “C/LMS” were used interchangeably as though they were one and the same thing, e-Learning is now described as a process of using electronic facilities, predominantly the web-enabled systems and multimedia, to facilitate teaching and learning, to manage the course and to enhance educational collaborations. A major contribution though, is in the clarification of pedagogical tensions on whether a C/LMS is a constructivist or a behaviourist instructional instrument. A substantiated position in this thesis is that a C/LMS offers educational solutions to different learning styles, not only to one but across all pedagogical paradigms. The contribution of the theory and the findings is discussed separately under the summary of the theoretical framework and of the findings, later in this chapter.

6.3 Revisiting the Theoretical Framework

Activity theory (AT) offered the most appropriate interpretive lenses of looking into an e-Learning context, from a socio-technical perspective. AT builds on Engeström's (1987) Developmental Work Research (DWR) model to propose a theoretically sound, work-oriented and activity-based analytical approach to viewing socio-technical projects. Collective activities are widely accepted (by a large community), they are rules-based (rather than haphazard), deliberate and systematic. Activities are a collective work by various people (subjects), in pursuit of a common purpose (object) (Engeström, 1987). In this approach, an IS project is viewed as a systemic entity or an activity system (Korpela et al., 2004). A systemic approach refers to a holistic analysis of a phenomenon in terms of the linkages between the purpose (object), the stakeholders (subject), the process (transformation), the mediating factors (tools, rules, community issues, the division of labour) and the outcome (Engeström et al., 1990; Mursu et al., 2007). The activity system approach also enables descriptive accounts, such that a phenomenon makes sense to practical developments, it makes operational sense to workers and that it makes scientific sense to researchers.

6.3.1 Revisiting the use of AT in the thesis

AT assumptions are parallel to the nature of the current investigation, and the objective of the current thesis. Therefore, the AT was used to develop the operational and analytical framework, the Activity Analysis and Development (ActAD) model in Figure 8 and a framework in Figure 9. The ActAD framework draws on the concepts and assumptions of AT to clarify the factors of, and to explain related tensions to, C/LMS adoption and use in institutions of higher learning. In this process, Figure 8 presents different aspects of a work activity in their respective levels of analysis from the national entity such as a country or culture, to a collective-actor (organisation), followed by the activity and, ultimately the individual actors.

Our actions derive their meaning from the context, and as such ‘actions without a context are meaningless’ (Mursu et al., 2007: 6). As such, the factors of C/LMS usage in teaching and learning cannot be adequately understood outside the social, technical and institutional environment to which e-Learning practices are embedded. The ActAD framework offers a systemic approach to understanding the factors of C/LMS adoption from a context, activity-

based and a multi-stakeholder (actor) perspective. It also highlights the tensions between the contrasting circumstances that mediate the transformation of goals, activities and actions, into outcomes. Understanding the tension between these factors in a work activity system is important in making sense of the reasons why the outcome hardly represents an extreme status of full success or failure. In the case of the current findings for example, even in the case of extreme dissatisfaction with the status and quality of e-Learning facilities at CPUT and UWC, there positive mediators that are strong enough to enable some level of C/LMS usage in these adversely affected institutions. The converse is also true at UCT and US, C/LMS usage is hardly perfect – despite the extremely supportive conditions, the reality which calls for continuous efforts to manage contradictions and changes in the context and environment of the mediating factors.

6.3.1.1 ActAD and e-Learning

Within the activity system, the 'object' refers to the purpose for which a social activity is carried out (Engeström, 1987). In the case of e-Learning, facilitating different styles of learning would be the main purpose of C/LMS usage. The 'subject', which refers to stakeholders, would include teachers (lecturers), system administrators, e-Learning coordinators, network administrators and students (Figure 9). The concept of stakeholders, however, should not be limited to individuals, but also to groups and entities (Korpela et al., 2004). So stakeholders (actors) in the e-Learning context also include institutions, departments and related bodies. The tools in the context of e-Learning include computers, systems, specific educational software, curricula and learning materials (as per Figure 9). The actual process of spelling out tasks, assigning responsibilities and the translating of rules and goals into various activities is described as the 'transformation'. Successful transformation is dependent on mediating factors (mediators) such as the 'rules' (pedagogy, curricula, policies, strategies and procedures), the tools as well as the social and technical contexts and, most significantly, the tensions between mediators.

This approach was found to be very useful in breaking down a phenomenon of study into respective components. The notion of mediators and transformation, in particular, offered an enriching account of underlying factors (processes, tools, resources, skills, procedures, rules, etc.) that inform or hinder C/LMS usage in academia.

6.3.2 ActAD Contribution to Practice and to the Scientific Body of

Knowledge

The contribution of a theoretical framework to the practice of knowledge is viewed in terms of whether the framework offers new insight into how the fundamentals of operations can be understood and improved at the first instanced, and whether the idea adds an important value to documented knowledge in the field (Locke & Golden-Biddle, 1997).

6.3.2.1 ActAD Contribution to the Community of Practice

Operationally, the ActAD framework empowers implementers of e-Learning to locate themselves within the broader e-Learning activity system. It empowers the lecturer, the courseware developer, the support personnel, and students to understand their roles and activities, in a systemic rather than a haphazard way. Whilst C/LMS uses have been tentative and speculative in purpose, the ActAD's goal-driven approach encourages an impact-focused attitude where the educator articulates a specific outcome and strives to achieve it. Because of the clarity of the roles of stakeholders, their activities and determining factors, planners and implementers can use the framework as both a planning and an evaluation tool. This way, hindrances to e-Learning implementations could be foreseen or failures traced and corrected, with a strong potential for more productive uses of C/LMSs in higher education contexts.

6.3.2.2 ActAD Contribution to the Scientific Body of Knowledge

There are two prominent approaches to viewing a theoretical contribution. At the first instance, a theoretical project is judged on whether it yields new insight that leads to paradigm shifts on obsolete knowledge (Kuhn, 1962; Martin, 1998). A theoretical contribution to research in this context is considered stronger when a problematic status quo is challenged, rejected and replaced. At the second instance is a more inclusive linear approach, that assumes that knowledge incrementally builds on and even co-exist with prior knowledge (Carnap, 1966, Latour, 1987). This thesis takes a linear view of a scientific contribution where a project would be equally significant whether it yields to paradigm shifts or even when it strengthens the foundations of existing knowledge.

The ActAD framework is a creative project, specifically developed according to the context of an emerging project. The e-Learning ActAD is a new framework that has been developed specifically to study e-Learning projects at universities. Built on a sound theoretical basis of

the AT, ActAD enables researchers to simplify the context of e-Learning according the components of the activity system. It offers a holistic approach to understanding, analysing and evaluating e-Learning activities within their context, which is a contribution to theory, thereby making an incremental contribution to the scientific body of knowledge.

6.4 Summary of the Findings

The thesis sought to uncover and explain the factors that hinder or encourage C/LMS usage by lecturers in South African universities. A graphical presentation of the summary of findings is presented in Figure 26, overleaf.

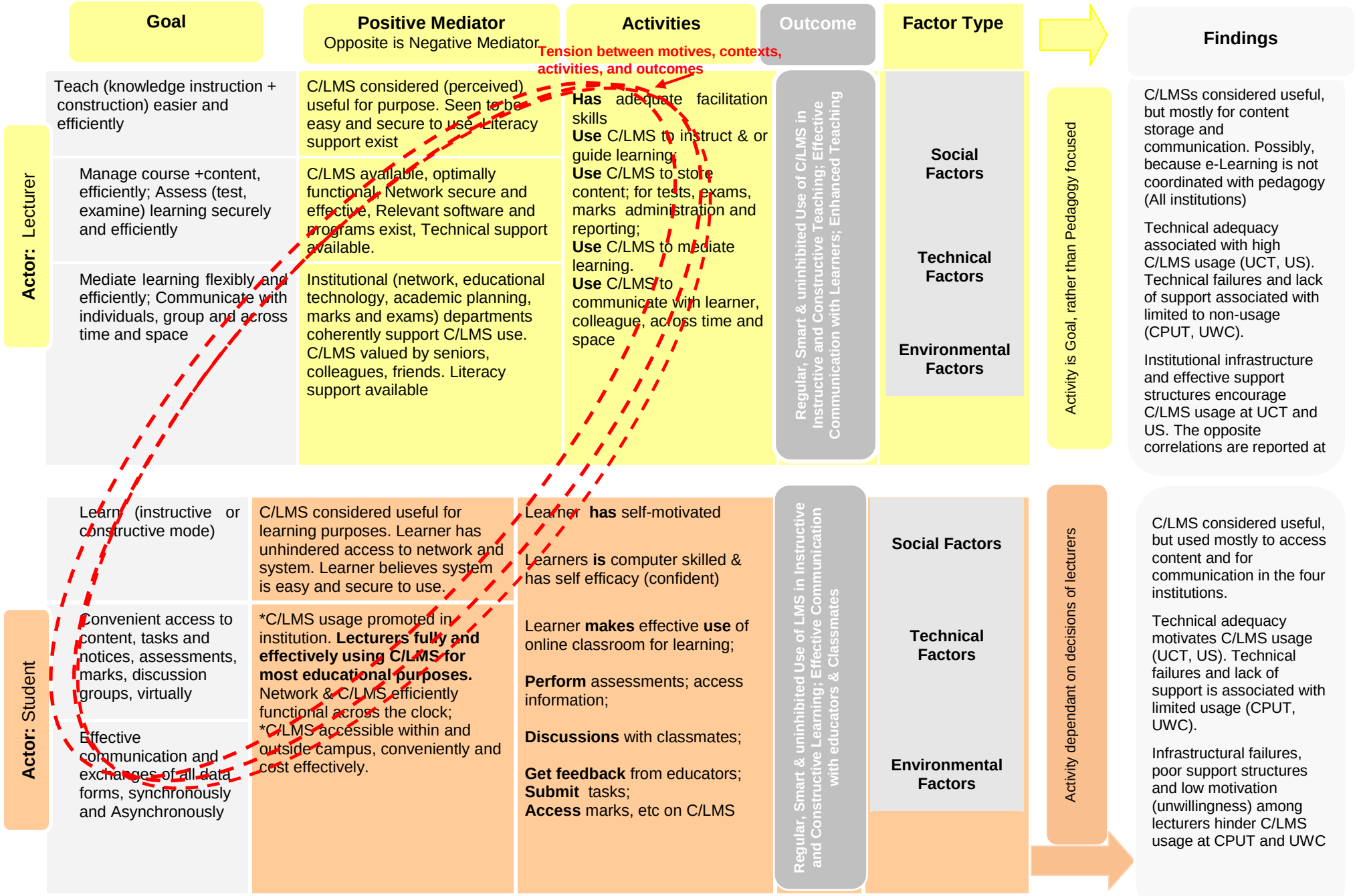

Figure 26: ActAD Summary of Findings

6.4.1 Student Perspectives

Group interviews were used to gather insight on how e-Learning and its C/LMS tool are understood by students. Students were asked to reflect on their perceptions of the usefulness of the tool, whether a C/LMS is being used in their registered modules, how it is being used, whether they are satisfied with the status of e-Learning infrastructure and the available user-support. They were also asked whether they are satisfied with current C/LMS usage patterns, and to explain their reasons. Students generally prefer a C/LMS to be used extensively in their courses. However, levels of satisfaction with the quality of infrastructure, functionality of C/LMSs and the patterns of usage by lecturers differed significantly between institutions.

Whilst all users depend on the availability and functionality of facilities, usage by students is very much dependent on the discretion of the lecturer. Without the lecturer using a C/LMS, willing students are damned.

The ActAD framework in this respect highlights the contradiction in terms of an imbalance between the factors that enable C/LMS usage (positive mediators) by students, and the factors that inhibit e-Learning (negative mediators). Despite the presence of positive mediators such as positive attitudes (belief in, and preference of), availability of basic infrastructure such as computers, internet, and the actual C/LMS as well as skill, confidence and self-belief, negative mediators such as poor quality of the system, reluctance by lecturers, limited support by the institution and infrastructure failures jointly inhibit e-Learning success in the adversely affected institutions in this study. To this effect, improving an information system success – including the implementation of an e-Learning system may a continuous and careful management of infrastructure and system quality, continuous appraisal of usage patterns and user satisfaction as well as a continuous evaluation of the impact of e-Learning – on both the individual and the institution (DeLone & McLean, 1992).

Insight from students was then used as inferential background to discussion with lecturers afterwards.

6.4.2 Dynamics of C/LMS Usage by Lectures

With the background information from students on the hindsight, lectures were asked to

indicate their understanding of e-Learning and a C/LMS, to reflect their perceptions on the usefulness of a C/LMS, whether a lecturer is using it, and how it is being used.

Lecturers describe e-Learning as both a process and a thing. As a process, it is a way of using Web-enabled technology systems to support teaching, learning, course management and communication. As a thing, e-Learning is equated with a C/LMS, to the extent of the two concepts being used interchangeably as though they are one and the same thing. Whilst lecturers describe a C/LMS as useful, sentiments differ on whether a C/LMS is a legitimate teaching and learning instrument and platform. There is a group of lecturers who see a C/LMS as a teaching and learning instrument, whilst others dismiss the relevance of this tool to teaching and learning. Instead, they describe it as a logistical tool. The works of Gardner (1983) and Armstrong (2010) on the styles of learning, as well as the work of Koshmann (1996) and Laurillard (2008) on the use of computer systems in teaching and learning, are used to critique cynical views on the relevance of a C/LMS in teaching (in section 5.4). The consensus is that a C/LMS offers potent teaching and learning solutions to different styles of learning, across various pedagogical paradigms. On the basis of its baseless accounts, cynicism about the relevance of a C/LMS is found to be intellectually suspicious and, therefore, rejected in this thesis.

Findings also show differences in the levels of satisfaction with the IT infrastructure, helpdesk support, and ultimately, the patterns of C/LMS usage between institutions. In line with the findings from students, CPUT lecturers were equally frustrated with the poor quality of IT infrastructure, system performance, and inefficient IT helpdesk services at the Cape Town campus. Lecturers also complain of the unnecessary administrative task of having to manually register students in each of the course they are teaching. Usage patterns, therefore, were very low. As an explanation, the problem is linked to recurrent managerial challenges associated with the politics of institutional mergers (from two Technikons into a University of Technology in 2005). A general argument among the long-serving personnel is that, though the problem manifests in technology system failures, the source lies elsewhere. It is stated that the merged operating units, such as the IT networks unit and e-Learning, have not fully consolidated yet, and are still shifting responsibilities and obligations between themselves. Hence things do not get done.

At UWC, a number of lecturers are dissatisfied with unresponsive helpdesk support. It also takes longer for computers and system to get fixed when broken. Literacy limitations and

resistance to change also emerged in all four institutions. The patterns of C/LMS usage were also low at UWC. The University of Stellenbosch (which uses a similar C/LMS brand as CPUT) does not experience a similar magnitude of system failures, and is extremely satisfied with the its IT helpdesk response time. The patterns of C/LMS usage are also high. At UCT, IT infrastructure, computers and the functionality of the Vula system are hailed by students and lecturers alike. C/LMS usage patterns are also very high.

On this basis, questions are raised under the discussion section. Firstly, why do two separate institutions (CPUT and UWC) that use different systems experience the same fate? Secondly, since CPUT and Stellenbosch are using a similar system (WebCT), the reasons for the two institutions getting different experiences and results are interrogated. How the e-Learning units at Stellenbosch and UCT are managed enhances the functionality of the system and motivates usage. The verdict of the two questions is that the brand of the system sound infrastructure management, effective management of implementing units, and the efficiency of the user-support structures has a stronger influence on usage than do other factors. It is concluded, therefore, that affected institutions would need to revisit their e-Learning implementation unit structures, relationships between interdependent units should also be consolidated, and careful attention be paid to the constant servicing and maintenance of existing infrastructure.

For those who see it as a useful teaching and learning tool, there is still no agreement on the practical details of usefulness. This is understandable because lecturers tend to represent different pedagogical stances. This point was evident in responses by different lecturers across the four institutions. What is unclear, however, is that despite disagreements, all lecturers are using the systems in the same way. Is it a question of ‘we are divided in thought but united in action? How bizarre! As an explanation, the problem with unusual and therefore impotent uses of technology in teaching learning lies in short-sighted approaches to e-Learning (Laurillard, 2008). Often educators ask wrong questions, get wrong answers, and implement those wrong answers. They look at e-Learning from the angle that says: ‘We have a technology system, now let us fit our educational programmes into it, and how can we do this?’ They then look at the available features and try to conform to them, without paying attention to pedagogical considerations. This trend is evident in e-Learning practices across the sampled institutions. Asked why they are using a C/LMS for example, most lecturers refer to what they have seen in the features that it is a very useful

communication tool. Mostly, they describe things that it offers or that students are asking for it – rather than to refer to the teaching and learning goal, purpose and related solutions a technology offers.

A recommendation is that since education has problems, and ICT has educational solutions, lecturers should start by 'understanding exactly what it means to learn'. This should be clearly articulated, with insight then used to ask a correct question: 'how can I use the technology to solve my educational problems?' That way educators are not only going to practise what they preach, but stand to improve the way a C/LMS is used to achieve its intended objective – to facilitate different styles of learning across different pedagogical paradigms.

6.5 Limitations of Study and Suggestions for Future Research

The initial sampling plan was to interview selected lecturers individually, and to conduct focus group interviews with selected students at CPUT, UCT, US and UWC. Lecturers, who are the main subjects of investigation, were successfully interviewed. However, access to US students was practically and administratively unsuccessful. Hence, they were excluded from the sample.

Students and staff raised concerns about the management of C/LMS implementations at CPUT and UWC. It does not make sense for universities to invest in costly resources, only to stop at the management of the implementation process. These issues could not be deeply explored in this thesis, and circumstances surrounding differences in the management of information technology and e-Learning units may need to be investigated in future studies.

Students also raised numerous suggestions towards a convergence of C/LMS with Web 2.0, multi-media and mobile technologies. On the basis of scope again, this suggestion could not be fully interrogated and remains an important subject of investigation in further research.

The ActAD was developed and used as an operational and an analytical framework to understand e-Learning within and between universities. Feedback on uses of this framework in similar studies would be insightful, and is awaited with great anticipation.

Whilst C/LMS usage is sill a concern in South African universities, universities in developed countries are now grappling with issues of impact. The fact that widespread usage of e-Learning systems in OECD universities was yet to make a visible impact on the quality of learning as of 2009 calls for caution in local implementations of e-Learning. Arguments in OECD (2005), WEF (2008) and the Canadian Council on Learning (CCL, 2009) committee structures are that e-Learning efforts are not yielding the anticipated return on investments. Hopefully, the situation may have changed for the better since then. Nevertheless, understanding specific circumstances around the cited initiatives, including the anticipated return on investment and the models of C/LMS adoption, would offer valuable reference for local contexts. Such a project deserves consideration in future studies.

Conclusions and recommendations are presented in the following section.

6.6 Conclusion

The objective of this thesis is to understand whether educators are using C/LMSs, how and why. As a practical contribution, the thesis sensitises the planners, developers and managers of institutional infrastructure, information technology network administrators, curriculum developers, educators, and e-Learning facility implementers of the enablers and inhibiting factors of e-Learning. For e-Learning administrators and facility managers, the thesis offers valuable insight into what could encourage C/LMS usage.

Institutional expectations for lecturers to use C/LMSs without helping them to understand a link between the theory and practice of computer assisted learning are called into question in this thesis. Hence, a vigorous discourse on technology, teaching and learning among educators in South African universities is strongly recommended. Poor network infrastructure and technical support inhibit C/LMS usage by lecturers in many universities. Whilst institutional adoption of systems is important, using malfunctioning networks and inaccessible or poorly maintained computer facilities is illogical. It is also apparent that the historically black and under-resourced universities are lagging behind the historically white and developed institutions on the implementation and use of C/LMS in sampled South African universities. Institutional officials, technology infrastructure and network administrators, academic planners, and e-Learning units need to collaborate in the planning and the implementation of e-Learning systems. Coordination of a C/LMS with administrative

systems and academic (knowledge) data-bases, active mediation of online learning by lecturers, and cooperation between e-Learning and IT network departments, should also be prioritised. E-Learning implementing units are strongly advised to engage lecturers on the relevance between C/LMS usage and the facilitation of different styles of learning if the educational value of e-Learning (or computer assisted learning) is to be enhanced in academia. On the basis of the findings, the following specific recommendations are presented.

6.7 Recommendations

The ActAD framework in this thesis presents e-Learning as a collective (multi-stakeholder) work activity system. Like in all systems therefore, effective management of the enabling processes of e-Learning is central to a successful transformation of the goals and activities into outcomes. The problem of limited usage is linked to managerial issues in the two adversely affected institutions. Therefore, it is recommended for institutions in similar circumstances to revisit their e-Learning implementation unit structures. Relationships between inter-dependent units such as e-Learning and IT network structures should also be consolidated where this is a problem.

Secondly, infrastructural failures and system malfunctions are a major hindrance to the adoption of e-Learning and the use of C/LMS tools. Removing obstacles to network functionality, constant servicing and maintenance of computers, programs, systems and network facilities have improved accessibility and usability of a C/LMS in two of the four universities studied. Drawing on this lesson in promoting adoptions of e-Learning in adversely affected universities therefore, is strongly recommended. Further, paying a careful attention to constant servicing and maintenance of existing infrastructure should be treated as a non-negotiable item in e-Learning implementations, if success is prioritised.

Thirdly, a minimalist approach to system and courseware design is equally important, and is recommended in this thesis. In this respect, emphasis should always be placed on the ease of use, in that system features and usage procedures must always be easy to understand and to use. Feature relevance to the task, the use of non-sophisticated terms, and to minimise the number of steps required in completing a single task play a significant role in this respect. UCT students find the e-mail notification system very convenient. It helps them manage their time better. However, since mobile phones are portable, always accessible

and convenient, converging the C/LMS notification facility with the mobile phone short-messaging-system (SMS) may improve the system usefulness even further. Integration of a C/LMS with the most commonly used multimedia facilities such as e-mail and mobile short messaging systems (SMS) is recommended for all C/LMS implementations in higher education institutions, so that students can be alerted swiftly whenever an entry is uploaded on a C/LMS. This will improve the use of their times and help them stay in touch with online developments.

Fourthly, a concern was raised by lecturers and students in one of the institutions that administrative tasks where lecturers are required to enrol students into courses is time consuming, burdensome and therefore inhibiting to C/LMS usage. Integration of a C/LMS with the central student records, whereby central registration into a particular course guarantees automatic enrolment into the e-Learning platforms. It would also spare students and lecturers from tedious tasks. A concern that C/LMS instructional planning is time consuming was also raised at UCT and Stellenbosch. The assumption in this thesis is that the concern maybe universal. In both institutions, recommendations were offered to other lecturers that they should get administrative support (dedicated specifically to the operation and management of a C/LMS).

Fifthly, poor helpdesk support was cited as a major hindrance to C/LMS usage in two of the four institutions. As a recommendation, e-Learning administrators should not define C/LMS adequacy in terms of the features alone, but in conjunction with the adequacy of a formalised supportive and constantly accessible helpdesk framework if hindrances to usage are to be minimised.

Sixthly, limited, inconsistent and speculative patterns of C/LMS usage were outlined as a major concern in the research problem of this thesis. Education has problems, and ICT has educational solutions, lecturers should always start by “understanding exactly what it means to learn” – whenever they undertake to design e-Classrooms. The learning aspect should be clearly articulated, with insight then used to ask a correct question: “*how can I use a technology to solve my educational problems*”? That way, educators are not only going to practice what they preach, but also improve the way a C/LMS is used to achieve its intended objective (to facilitate different styles of learning across different pedagogical paradigm). On limited interest and resistance to change, mostly dues to limited computer skills, a vibrant discourse on e-Learning and pedagogy in inter-departmental seminars should be ignited.

The seventh point relates to the linking of a C/LMS with pedagogy. Using a C/LMS to support a single style of learning may be empowering for a specific group of learners, but alienating for students with different learning styles. Whilst there are different styles of learning, one learning style within an individual does not imply the absence (or presence) of other learning styles in a person. In addition, none of the learning styles work in isolation but in synergy with other styles within an individual. To this effect, the blending of different modes of instruction is likely to meet different learning needs and learning styles. A blended approach to academic instruction is therefore recommended in this thesis.

When all is said and done, it is crucial for e-Learning planners to remember that C/LMS usage in e-Learning should be used in ways that add value to teaching and learning processes. A C/LMS for example, would improve the management of larger classes. In larger classes with more than 1000 students for example, each learner would still have a personal interaction with the course over a C/LMS. Introduction of the online tutorial system where a human tutor interacts with learners over a C/LMS (as students suggest), would enable a division of larger classes into smaller groups with students getting that special attention, whilst the challenges of securing physical venues (meeting points) would be alleviated.

In closing, exploring supportive linkages between technology and pedagogy would improve the usefulness of e-Leaning adoptions in South African universities, hence an interactive discourse to this end is strongly recommended.

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Interviews from preliminary studies: Full names of participants are withheld for confidentiality reasons. Instead, abbreviations are used (as per Czerniewicz, et al, 2007).

I.X, 2006;

I.M, 2006;

I.H, 2006;

I.K, 2006

APPENDICES

Appendix 1: Reflections on the Journey through the Project

One thing for sure, is that the journey through this PhD process was never a smooth ride. The phases of the project, from the proposal stage to completion are presented in graphical format in Figure 27. In this illustration, each activity is presented with colour that spreads across the months in which a project was conducted.

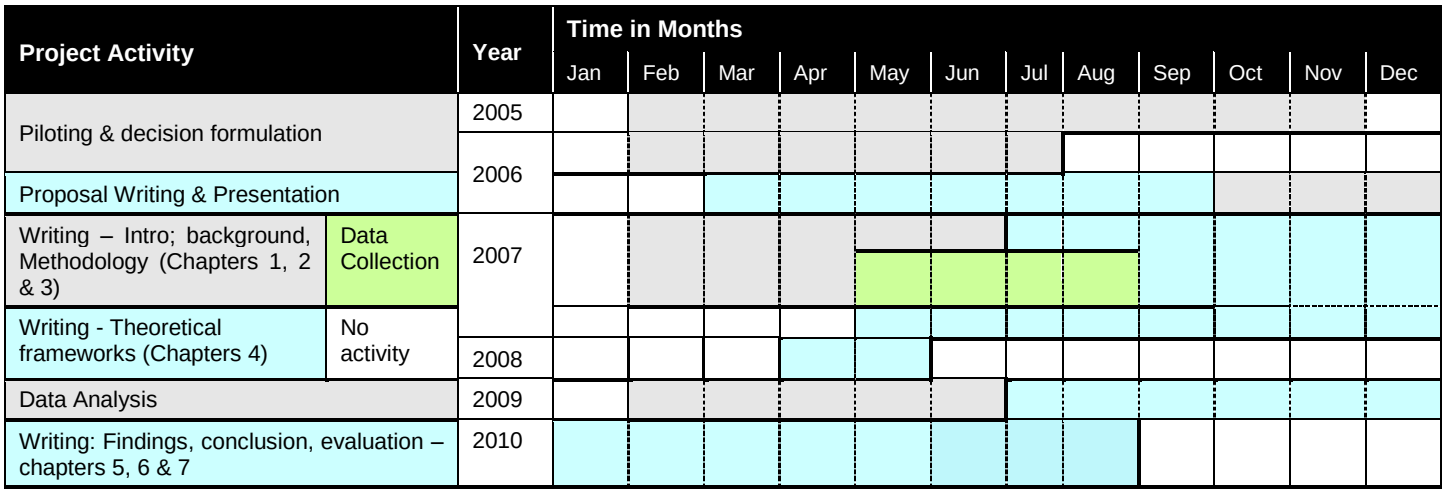


Figure 27: Research Timeline

Following a review of pilot studies, coupled with insight from conferences and literature in the field of e-Learning, the topic of study was finalised in July, followed by a presentation of the proposal in a departmental setting in September 2006. Preparing and defending a proposal against complex interrogations by departmental academics was a daunting task. From this moment, the ethics clearance certificate from my institution (UCT) and three other institutions (CPUT, US and UWC) could and were applied for. Losing employment and having to survive without income or scholarship in 2008 amounted to a 9 month period of inactivity in the project. Balancing employment duties with the analysis and the finalisation of the project in 2009 to August 2010 was even more demanding. It took many meetings, disagreements with the supervisor, and many sleepless nights of re-writing. At the end, it was a complex but invaluable experience.

Appendix 2: Sampling- Participant Selection

Table 16: Selection of Lecturer Participant Samples

Institution*	Department **	Participant ***	Interviews	
			Date: May–July 2007	Time
CPUT	FID – IT	(a) JB; (b) MB; (c) MP; (d) WO	(a) 29 May; (b) 20 May; (c) 21 May; (d) 22 May.	(a) 14h30-15h23; (b) 10h30-11h03; (c) 10h00-10h36; (d) 12h00-12h53.
	FID – e.IA	(a) CU; (b) IM	(a) 22 May; (b) 21 May	(a) 10h30-11h15; (b) 11h00-11h40
US	Nederland; Politics	(a) LV; (b) WS	(a) 2 July; (b) 2 July	(a) 12h00-12h53; (b) 8h45-9h20
	Geology	(a) FDG	(a) 2 July	(a) 13h-13h21
UCT	Comm - IS; Man Studies	(a) KS; (b) FT; (c) NF	(a) 30 June; (b) 24 June; (c) 24 June	(a) 12h15-12h52; (b) 12h56-13h30; (c) 12h00-12h53
	Hum - Politics; Econ; African Studies; Religious Studies	(a) JA; (b) AL; (c) HG; (d) BS	(a) 30 June; (b) 30 June; (c) 30 June; (d) 30 June	(a) 13h08-13h47; (b) 16h15-16h58; (c) 11h41-12h06; (d) 15h30-15h51
	Education -CET	(a) TC	(a) 30 July	(a) 14h27 (e-mail)
UWC	EMS – IS	(a) GW; (b) TM; (c) ZM	(a) 20 May; (b) 17 June; (c) 17 June	(a) 14h28-14h53; (b) 11h30-12h28; (c) 17h30-17h58
	EMS - Politics	(a) LP; (b) KG	(a) 20 May; (b) 27 May	(a) 13h45-14h20; (b) 13h35-14h38

*Cape Peninsula University of Technology (CPUT); University of Stellenbosch (US); University of Cape Town (UCT); University of the Western Cape (UWC).

** Faculty of Informatics & Design (FID), Information Technology (IT); e-Innovation Academy (e.IA); Centre for Educational Technology (CET); Economics & Management Sciences (EMS). Information Systems (IS).

***Abbreviations of participant names. Full names withheld for confidentiality (ethical) reasons.

Table 17: Focus Group Time Table

Institution	Venue	Date	Time	# of Participants	Moderator
CPUT	Room 1.33, 80 Roeland Str. CT Computer centre, Bellville Campus	Sat, 5 May, 2007 Sat, 12 May, 2007	9h30 – 12h30	**10** **10**	Confirmed, all attended, all completed the interview
Stellenbosch	Omitted due to difficulties in securing samples and the venue				
UCT	Meeting room, Dept of IS, LC, Upper Campus	Sat, 25 May, 2007	9h30 – 12h30	**10**	Confirmed, all attended, all completed the interview
UWC	Study room, 5th Floor, Main Library	Sat, 19 May, 2007	9h30 – 12h30	**10**	Confirmed, all attended, all completed the interview

Appendix 3: Students' Focus-Group Interview Request Letter

P O Box 304
Rondebosch, 7701
Mlitwan@cput.ac.za
01 April 2007

Adoption & use of ICT (e-Learning tools) for Teaching & Learning in Tertiary Institutions in South Africa

Dear Student

I am a PhD student in the Department of Information Systems at the University of Cape Town (UCT). I am conducting a research study that seeks to understand and explain the factors that affect the usage (& none-usage) of ICT for teaching and learning (i.e. e-Learning) at universities. A specific example of e-Learning technology is a learning management systems (LMS) such as WebCT, KEWL, VULA, CONNECT, ILIAS, ATUTOR, etc, depending on a specific system used in your institution.

About the investigation/ study

1. There is a growing belief that technology improves learning experiences, and enhances the quality of teaching and learning in education.
2. Therefore, almost all universities now have computer laboratories, internets, intranets, and e-Learning programs. They are adopting one form of a learning management system or another.
3. There is however, no agreement and therefore no clarity on how e-learning improves (or should improve) teaching and learning processes in academia.
4. As a result, there is no consistency in the implementation of e-Learning in academia. Recent research suggests that some academics are reluctant to use e-Learning tools. This in turn has an effect on how students use and benefit from the use of e-Learning tools.
5. Even where e-learning tools are used, it is not clear how, under what guidelines, and for what purposes LMSs are used in our universities.
6. The aim of this research is to find explanations to incoherent, limited, and ultimately non-usage of e-Learning tools such as LMSs at higher education institutions in South Africa.

The problem is that unless we know what informs the current patterns of technology adoption and usage (or non-usage), we may never know how to ensure the effective use of LMSs for the optimal benefits of educators and learners in our institutions. It can be a self defeating exercise for institutions to invest in technology that may not be used to its optimum potential to achieve intended objectives.

How you can help

The purpose of this letter to request you to participate in a group interview to share your insight on e-Learning and your experiences with e-Learning tools (such as WebCT) for learning purposes in this institution.

Interview details

The Group interview (the focus group) will take place at the Department of Information Systems, Leslie Commerce, Upper Campus, UCT, from 16h30 to 17h30 on Friday, 25 May, 2007. You will receive **R60.00** for participation, and **refreshments will be provided**.

The study is for a doctoral degree qualification, and data will be used solely for academic purposes. There are no known risks or dangers to you associated with this study. The researcher(s) will not attempt to identify you with the responses to your questionnaire, or to name you as a participant in the study, nor will they facilitate anyone else's doing so.

Let me thank you in advance for your participation

Sincerely

_____

Nhlanhla Mlitwa

(PhD Candidate, IS Dept, UCT)

Research Participant: I acknowledge that I am participating in this study of my own free will. I understand that I may refuse to participate or stop participating at any time without penalty. If I wish, I will be given a copy of this consent form.

I Batandwa hereby accept the invitation to participate in this focus group research interview as outlined above. Singed at UCT on this 25 day of Apr, 2007

SIGNATURE [signature]

Appendix 4: Student Focus-Group Interview Questionnaire

Factors of Integration and Use of ICT for Teaching and Learning in South African Higher Education Institutions

Questions

Building on the findings from previous studies that suggest high preference and usage of ICT by students – that is often inhibited by limited interest by academics, the focus of the data collection (from **students)** is to **get a full insight** (explanations) into the patterns of the adoption and use of a learning management system for learning purposes on campus.

The questions are framed into social, organizational and related factors (the human environment) that could explain the use of a learning management system in the institution. It is also important to establish what 'sense' the students and academics make of e-learning tools. The study thus, further probes into the meanings or roles they attach to technology. In this case it becomes important to understand how meanings and perceptions contribute to usage or non-usage patterns (interpretations and explanations should be more important than the factual details in this case).

Question 1 should find insight on the **student understanding**, **views**, **perceptions** of (a) **e-Learning**, and its **Learning Management System (LMS)** tools; (b) Emphasis should be placed on explanations on why they see it the way they do:

1.1 To get their understanding of e-Learning (& the use of e-Learning tools) in their university. An example of an e-Learning tool used in this university is important (i.e. they should be able to give WebCT as an example) though others who had studied in other institutions may offer other examples [It will be great to learn what they think it is, what an e-Learning management system (LMS) is, its purpose, whether it is important and if it is, why they think so].

1.2 To find out when they first arrived at this institution, and whether they have always been using an e-Learning Management System (LMS) throughout the years. How did they learn to use an LMS, and how was the experience (any training? easy, difficult?). [Here we should be able to compare when they didn't use, when they first started using it, and today. Does it make any difference - & what is the difference?]

1.3 Do students think it is important? [under what circumstances, and why?]

Question 2 – How e-Learning (LMS) is Used on Campus

2.1 What is e-Learning (and the LMS) used for, and is this the way you expected it to be used? [if not (yes), please clarify]

2.2 How often do you write tests, engage on question & answer (quiz) processes, access your marks on the e-Learning platform, and engage in a group discussion with your lecturer and other students? [if it is isolated cases, please specify]

2.3 What role does the LMS play in enabling the communication process between students, and between students and academics?

2.4 Are all academics (in all courses that you know) using e-Learning [but why?]

2.5 Do you know of any student who in this university who does not want to use e-Learning?

2.6 Do you think that all students are using it [why]?

2.7 Would you describe your degree (or courses) as technical & computer related or non-technical? [is e-Learning adding any value in the way you do your course?, how would you recommend the university to continue the use of e-Learning? explain]

2.8 Are all educators (those who use it) following a similar pattern and format of presenting a course (& content) in your learning management system? [What are differences? What do you like and dislike most, & why?]

2.9 Would you support a move to discontinue the use of this tool (please elaborate why)?

Question 3 – Task: Comparison between e-Learning & the Traditional Classroom

3.1 Should all courses and all academics be using e-Learning, and what would be your motivation?

3.2 If so, should the traditional classroom lecture approach be discontinued? Why

3.3 Should lecturers be free to choose between using a traditional classroom approach and e-Learning (the either or situation)?

3.4 If academics choose (use their democratic right) not to use e-Learning, what would students loose?

3.5 How does the use of e-Learning help prepare you (if it does at all) for further studies? [How do you know that this is important for further studies?]

3.6 If the university stops using e-Learning, how would your learning processes compare to other universities? [Would you be inferior or remain the same as others, how do you know this, and why does it matter?]

3.7 If only e-Learning is used and the classroom approach is abolished, what would students loose?

3.8 How does the use of e-Learning help prepare you (if it does at all) for future careers (work)? [How do you know that this is important for the industry?]

3.9 If some type of a balance in this choice should be struck, what should it be?

Question 4 - Institutional factors, power, decisions about e-Learning

4.1 Who decides that e-Learning can be used in one course & not in others, who decides how it should be used? [who should be involved in your opinion?]

4.2 How do you get to use e-learning (an LMS) in each of your courses (what is the authorisation procedure in each course)? Is this process always followed (please clarify)?

4.3 Are there cases where you would prefer the course to be present on e-Learning systems, and find that it is not available? Please explain those circumstances. [How do you feel, and what would you recommend?]

4.4 What do you normally do in such circumstances, and where the course is not well presented on e-Learning? [do you have channels in place to voice your grievances, suggestions, please clarify]

4.5 What do you do when there are technical problems with your institutional network [Do you have the help line? What is the procedure – do you call or e-mail? What is your relationship with Network people? What is the response period]?

4.6 Do you know of a formal policy by the university on the use of e-Learning by students?

4.7 Is the role of an LMS in enhancing learning processes communicated by the university to students? [please elaborate]

Question 5 – Do educators promote the use of e-Learning?

5.1 Would you say that your academics are fond of using e-Learning? [please clarify].

5.2 Are there times when you have to **unsuccessfully** request a lecturer to make use of e-Learning? [What seems to be the problem?]

5.3 Do you think your lecturers know how to effectively use the e-Learning systems? [Why do you say so?]

5.4 Why are you and your institution using e-Learning, and why the current tool?

Question 6 – How technical support, access and cost factors affect the use o an LMS by students

6.1 While on campus, does the university a sufficient number of fully functional computers for access by all students? Please elaborate

6.2 How easy is it for you to find an open computer to use for academic purposes at the time when you need it?

6.3 Where do you frequently make use of e-Learning tools (home, work, university), at what times, and why these times?

6.4 Do you have your own internet linked computers to use for full academic purposes at home (or where you leave)?

6.5 What are the most common difficulties (frustrations) you often experience in your encounter with e-Learning as used in this institution?

6.6 If you pay for the Internet, how do **cost** considerations affect the frequency of your use of the LMS?

6.7 Are existing facilities will be adequate for all students in terms of the quality (i.e. internet speed, relevant programmes, close proximity)?

6.8 Do you experience any network failures, slow internet and virus infections systems that you use? (elaborate). If you were only using e-Learning to do all your studies, how would these difficulties affect your learning?

Appendix 5: Sample of Focus- Group Transcript

Factors of Integration and Use of ICT for Teaching and Learning in South African Higher Education Institutions

Students Focus Group Interviews

CPUT, Cape Town 05/05/07

Moderator: Ok, people, just to start with most of you know one another, but not everybody. Let's just quickly introduce ourselves. Now, I'm Marie and my job is this and whatever. Ok, so can I just ask you? Just say who you are and what you are studying.

CPUT, C-R1 : my name is Joanne. I am doing BTech in IT.

Moderator: You're doing what?

CPUT, C-R2: BTech in IT

Moderator: BTech in IT. Ja, and how long have you been a student here?

CPUT, C-R3: Four years

Moderator: So you know the place?

CPUT, C-R4: Ja

Moderator: Great, thank you for that. What about you?

CPUT, C-R5: I'm Brad Steenberg. BTech in IT as well

Moderator: OK, same course and how any years?

CPUT, C-R6: Four years

Moderator: Ok, so you are in the same class then

CPUT, C-R7: No. I'm part time

CPUT, C-R8: Full time

Moderator: Not really. Oh OK then I must ask that question too. You're part time and he's full time

CPUT, C-R9: Hi, I'm Paul. I'm full time. Forth year. BTech, doing IT.

CPUT, C-R10: Izak, also forth year IT, but this is my first year in CPUT.

Moderator: OK, alright. Where were you before?

CPUT, C-R11: Northlink College and UNISA

Moderator: Alright. And what about you.

CPUT, C-R12: I'm Kachane

Moderator: Oh, your first year here, and that's full time? Ja, OK. I will be with you in a second. And you?

CPUT, C-R13: Damisile. Doing BTech, part time. My fifth year.

Moderator: So you're an old student. OK. Hello, sorry

CPUT, C-R14: Sorry I'm late

Moderator: That's fine. I told them all I have nothing to do with the technikon or nothing. I'm completely neutral. I've been asked by Nhlanhla to moderate the focus group. So I don't know more than anybody. I know weigh less, but my job is to ask the questions and I want your opinions are there is no right or wrong. So, don't say, what must I say, say what you think. Just introduce yourself. What is your name?

CPUT, C-R15: Maghmuda

Appendix 6: Sample of Lecturer Interview Request Form

P O box 304
Rondebosch, 7701
Cell: 072 585 3347
01 April 2007

Age Group 26
Room 6-59

Adoption & use of ICT (e-Learning tools) for Teaching & Learning in Tertiary Institutions in South Africa

Dear ~~Dr/Prof/Mr/Ms~~ Werner Schoeman

I am a PhD student in the Department of Information Systems at the University of Cape Town (UCT). I am conducting a research study that seeks to understand and explain factors that affect the usage (& none-usage) of ICT for teaching and learning (in particular, e-Learning) at universities.

Recent research suggests the existence of challenges that limit the full use of e-learning tools by some academics. This in turn impacts on how students use and benefit from the use of e-Learning tools. Unless we know what informs the current patterns of technology adoption and usage (or non-usage), we may never know how the optimal benefits of LMSs usage by educators and learners can be ensured. **The aim of this research is to find explanations to incoherent, limited, and sometimes non-usage of e-Learning tools such as LMSs at higher education institutions in South Africa.**

I kindly request your participation in an interview to share your experiences, motivations, and even frustrations with e-Learning tools in the courses you teach.

Interview details

Interview will be between 30 and 45 minutes, at the date, time and venue convenient to you. There are no known risks or dangers to you associated with this study. The researcher(s) will not attempt to identify you with the responses to your questionnaire, or to name you as a participant in the study, nor will they facilitate anyone else's doing so. Findings will be used for academic purposes, and may contribute towards informed policy-making around educational technology development and implementation among higher education institutions in South Africa.
Thank you in advance for your participation.

Sincerely

Nhlanhla B.W. Mlitwa
PhD Candidate, IS Department
University of Cape Town (UCT)

Agreement to participate - Research Participant:

I acknowledge that I am participating in this study of my own free will. I understand that I may refuse to participate or stop participating at any time without penalty. If I wish, I will be given a copy of this consent form.

I Werner Schaeron hereby accept the invitation to participate in this research interview as outlined above. Singed at Stellenbosch on this 2 day of 07, 2008

SIGNATURE

Appendix 7: Example of Ethical Approval Letter

Private Bag X17, Bellville, 7535
South Africa
Tel: +27 (0) 21 959 2102/2131
Fax: +27 (0) 21 959 3426
Website: www.uwc.ac.za

OFFICE OF THE REGISTRAR

24 May 2007

Mr Nhlanhla Mlitwa
IS Department
University of Cape Town

Dear Mr Mlitwa

PERMISSION TO DO RESEARCH AT THE UNIVERSITY OF THE WESTERN CAPE

Your application for permission to conduct research at the University of the Western Cape refers.

Thank you for complying with our application procedures. I hereby grant you permission to proceed with the research at our University.

Yours sincerely

Dr Ingrid Miller
REGISTRAR

UNIVERSITY of the WESTERN CAPE

A place of quality, a place to grow, from hope to action through knowledge

Cape Peninsula University of Technology

Faculty Research Committee
Faculty Informatics & Design
Cape Peninsula University of Technology (CPUT
08 April 2007

Re - Request: Permission to conduct academic research among students and staff in Bellville and Cape Town Campuses

Dear Mr Mlitwa

The above matter refers.

Your letter dated 01 May 2007 was considered by the faculty's research committee on the 2nd of May 2007 where temporal (in principle) permission was granted pending verification by the committee on its official meeting on Tuesday 8 May 2007.

Your research was tabled and discussed by committee members in this meeting.

After careful considerations, the committee has granted you permission to conduct research within the institution with effect from 01 April 2007 – to 01 April 2008. This permission remains valid within this period, provided that such research is conducted in line with the ethical considerations and that it remains within the objectives specified in your letter of application. We reserve the right to revoke this permission, should your study diverge from ethical, academic, or other logical practices as agreed upon.

On behalf of the committee, I would like to wish you every success with your research project.

Sincerely,

Chairperson

PO Box 1906 Bellville 7535 South Africa
086 123 2788

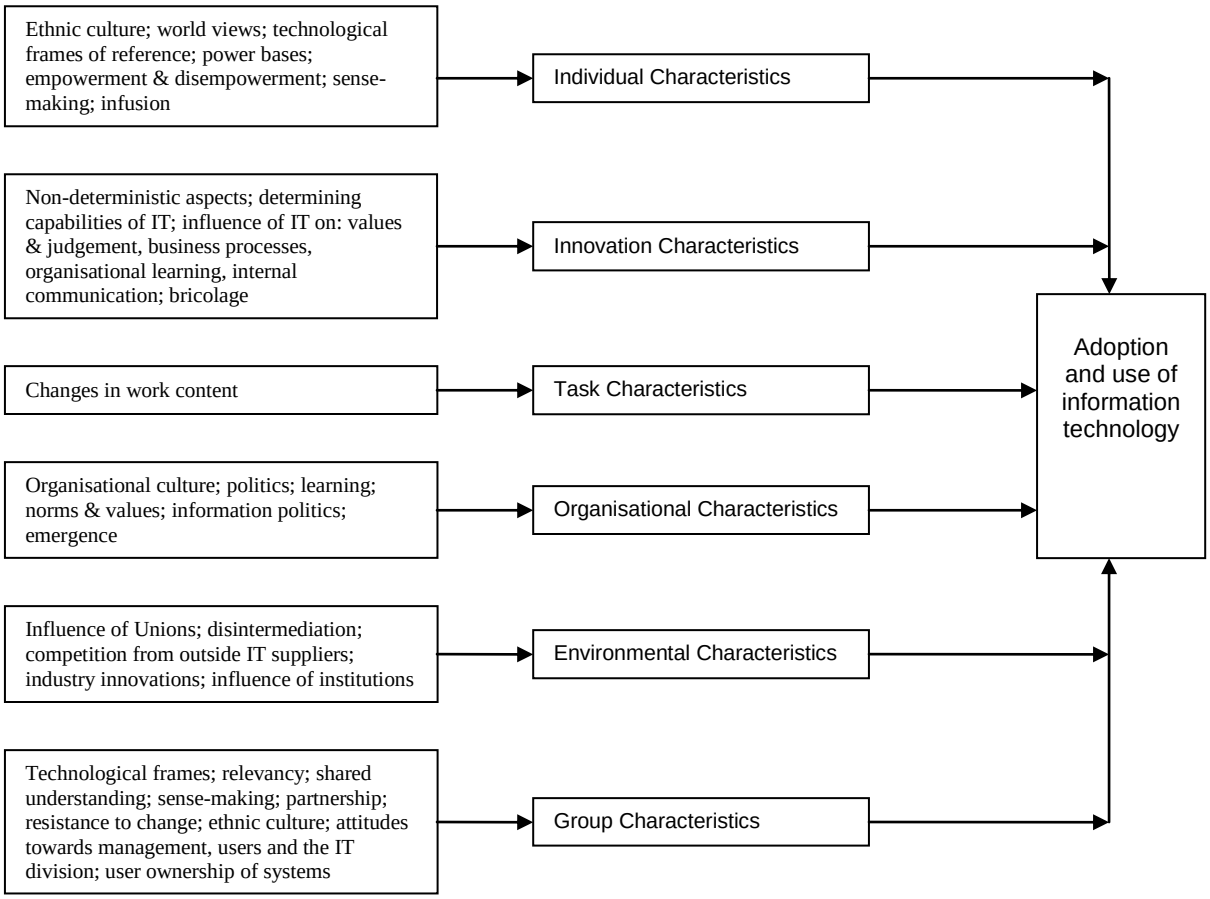
Appendix 8: Sample of Lecturers Interview Data Transcripts

As an example, an interview questionnaire and response transcript for one of the lecturers at the University of the Western Cape is presented below:

nal example, an interview transcript of one UCT lecturer is also presented in the following passages.

The idea was to give one example of the transcripts, but due to the sensitivity of the concerns on technical failures in one of the institutions, I have decided to include a third transcript to give readers direct access to the raw transcript when reading controversial parts of the findings in this institution.

Appendix 8: The Human Environment Model



Source: Du Plooy and Roode, 1999